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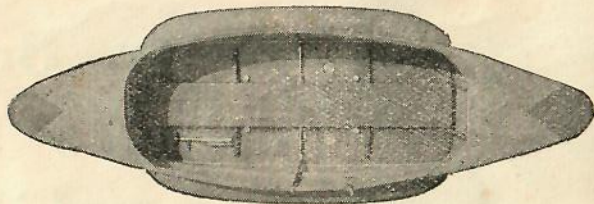
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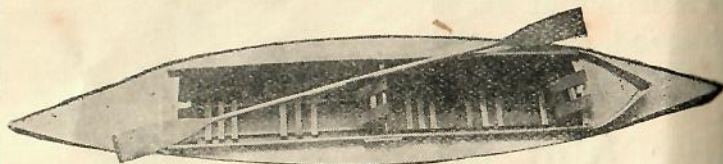
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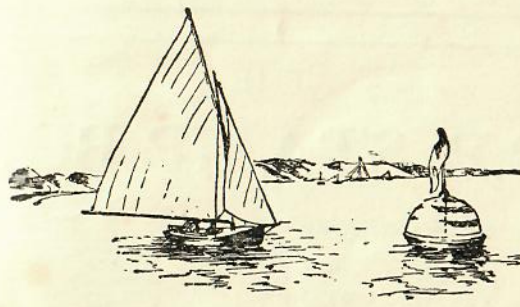
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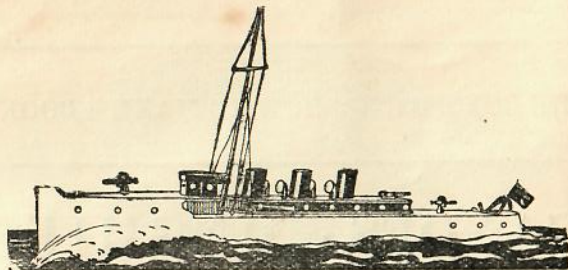
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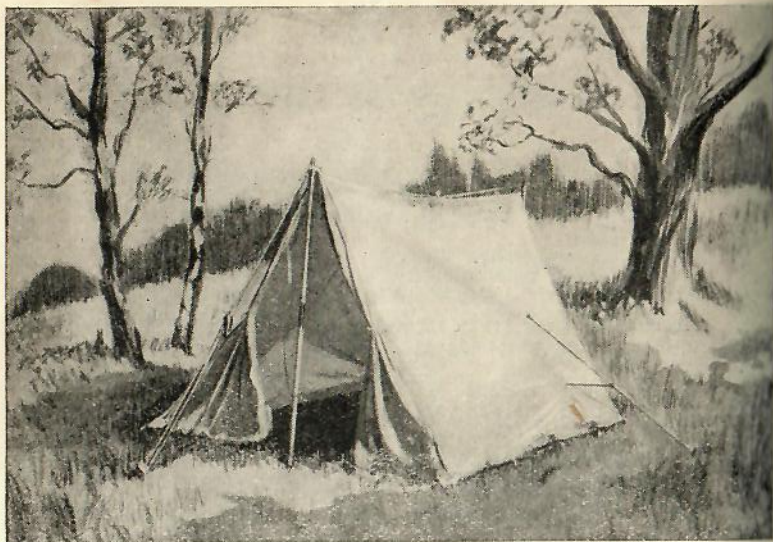
PREFACE

EVERY boy who likes paddling a canoe, or sailing a small boat on river or lake, much prefers to make his own craft if circumstances allow. It is to provide such a boy with the means to gratify his wish that this little handbook has been compiled. The "Boy's Own" Canvas Canoe has been built and used by hundreds of lads all over the world, and has proved itself to be an eminently suitable boat for the purpose. The other small craft here described—dinghies and punts—have also been widely built with most successful results.

In other volumes of this series, now in preparation, practical articles will be included for the boy-worker who desires to make his own model flying machine, model yacht, kite, sledge or toboggan, bookcase or corner cabinet, electrical and scientific apparatus, and various other useful articles. The "How to Make" books are designed to embrace all hobbies. The boy who delights in carpentry and bench work generally will find the handbooks replete with instruction that will usefully fill his leisure hours.

The articles throughout have been specially written by experts, and all the boats, models, etc., dealt with have stood the test of actual use. Numerous diagrams and other illustrations are provided, so that the boy-worker will have no difficulty in following the directions given.

A. L. H.



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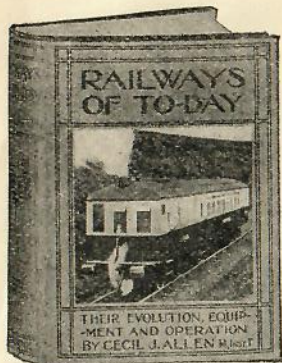
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CANOES, DINGHIES, AND PUNTS

HOW TO MAKE A CANVAS CANOE

By E. T. LITTLEWOOD

I PROPOSE to give directions for the construction of a canvas canoe, requiring no great expenditure of money, from a week to a fortnight of spare time, a very few tools, and a moderate amount of skill.

I have from time to time made canoes of various kinds, and have been led to adopt the pattern to be hereafter described as being most easily and cheaply constructed, and as possessing the important characters of speed, comfort, safety, and fair

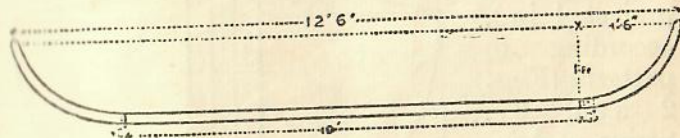


Fig. 1.

durability, and not being too heavy to carry on the shoulder for a quarter of a mile or so if necessary.

To proceed at once to my directions. It will be best to build under cover, though this is not a necessity. For the keel take a piece of straight

CANOES, DINGHIES, AND PUNTS

deal or pine, free from imperfections, 10 ft. $\times$ 2 in. $\times$ 1 in. For stem and stern post, which should be alike, pieces of oak or elm should be cut to the

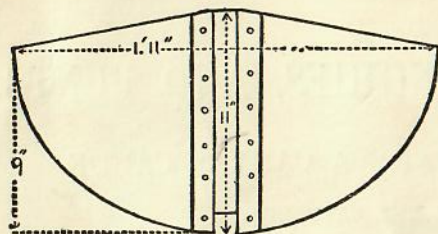


Fig. 2.

pattern shown (Fig. 1) from a piece with a curved grain (it need not cost much), 1 ft. 6 in. $\times$ 1 ft. $\times$ $\frac{3}{4}$ in.; 3 in. at the end should be bevelled off and fitted to the end of the keel, taking care that the latter forms one plane with them. They are best fixed in their place by driving copper nails through, and tapping their ends over perforated caps known as "burs," which can be easily obtained; but wire nails, clenched, will do here, as in other parts of the work.

Next from $\frac{1}{2}$ -in. deal plank cut out two shapes to fit over keel (allowing it to project $\frac{1}{4}$ in.), according to patterns (Figs. 2 and 3). Strips of $\frac{3}{4}$ in. should be nailed on each side of the

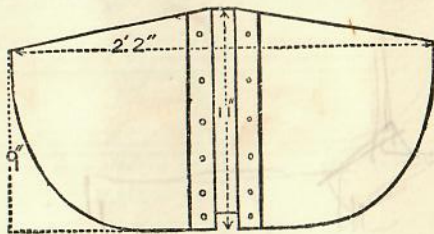


Fig. 3.

sockets cut for the keel, coming rather nearer at their other ends. The use of these is both to strengthen the shapes themselves and to make them fit firmly

CANVAS CANOE

and tightly to the keel, also to make supports for the coamings round the well, to be described later.

The shapes should be placed with strips turned towards the ends of the canoe and at right angles to the keel; the larger one 10 in. behind the middle point of the keel, and the smaller one 2 ft. 10 in. in front of the same point (Fig. 4). Take care that the middle points of the shapes are in a straight line with the stem and stern post. A good nail

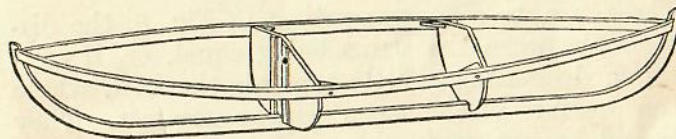


Fig. 4.

may now be driven right through the two ends of each pair of strips, clipping the keel tightly between them. Next take two clean strips of deal rather longer than the canoe. They should be perfectly free from knots or imperfections, or much trouble will be occasioned afterwards. Say, $1\frac{1}{2}$ in. $\times$ $\frac{3}{4}$ in. Fit them on as in Fig. 4, bevelling off the ends, and nailing into stem and stern post.

They should be allowed to take their natural curve, but pulled lengthways a little, so as to hold well to the shapes. Both sides should be alike, and the shapes should not be driven out of the central line. To prevent this, before nailing get a friend to hold the two ends against the stem while you nail the other ends to the stern post. Then nail the former ends to the stem, pulling them towards you a little, and keeping your eye on the

CANOES, DINGHIES, AND PUNTS

central line. They may now be nailed to the shapes by means of corner pieces.

Next prepare, or get a carpenter to prepare for you, ten strips a little longer than the canoe, and $\frac{1}{4}$ in. square. This is a very good thickness.

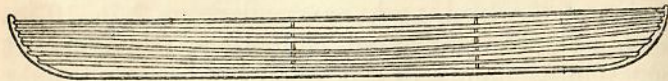


Fig. 5.

These are to be arranged as in Fig. 5, the distances between the strips being equal, or, if anything, decreasing a little towards the keel, where the pressure of the water will be greatest. They should be put on in the same way as the upper stronger strips which already form the gunwale. I may repeat that this thin wood must be thoroughly good. If any strip is not so it is useless, and must be replaced by another. Cut rests for the strips in the shapes, allowing them to project a little.

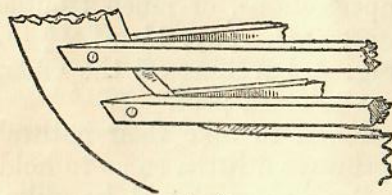


Fig. 6.

of the strips which would press into the canvas must be planed off. The ends, especially near the keel, will require care in fitting (Fig. 6).

It is better to drive no nails through the strips except at the ends. Those parts of the shapes

CANVAS CANOE

which are between the strips should now be hollowed out (Fig. 7), so that when the water presses in the canvas no projection shall be produced across the direction of motion of the canoe, as such projections seriously retard its progress. All the edges of the strips which would be liable

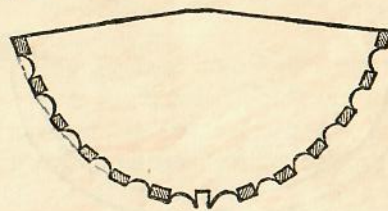


Fig. 7.

to work through the canvas should be shaved off as before mentioned.

Next for the coamings round the well in which to sit. This should be made generally strong. Make a framework of deal 2 in. $\times$ $\frac{3}{4}$ in., to fit in exactly between the shapes, as shown in Fig. 10. The breadth at the stern end may be 18 in., and at the other 14 in. This will be quite broad enough. The two end-pieces should be well nailed into those strips by which the shapes were strengthened. Also fit struts between the middle points of the sides of the well and the gunwale. Fit two strips, about $1\frac{1}{2}$ in. $\times$ $\frac{3}{4}$ in., or 2 in. $\times$ $\frac{1}{2}$ in., from the middle point of the top of each shape, or end of the well, to the stem and stern post, nailing the gunwale at each end into it through some interposed wedges, so as to make a solid triangle at each end.

In each of the three compartments of the canoe fit a strengthening rib, as shown in Fig. 8 for middle,

CANOES, DINGHIES, AND PUNTS

Fig. 9 for ends, which will sufficiently explain the construction. They should be fastened to the gunwale, but the thinner strips had better be arranged merely to rest against them and not to be nailed into them. They need only be made of thin wood. Thin oak would be best. They may

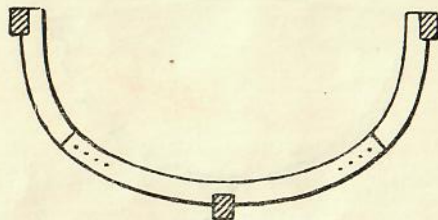


Fig. 8.

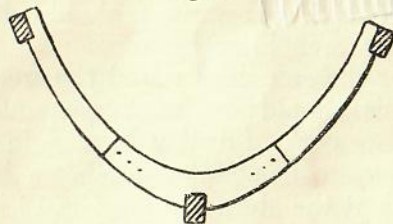


Fig. 9.

also be made by bending thin ash, or other flexible wood, into the required shape, in this case with the greatest breadth running fore and aft.

Put one or two light cross-strengtheners between the two sides of the gunwale, and one or two from the keel to the upper longitudinal pieces. The latter may be nailed into the cross-pieces. Go carefully over the whole framework, removing any eminences or loose nails likely to wear a hole in the canvas, remembering always that the water

CANVAS CANOE

will press it well against the framework, and the canoe will be ready for covering. But the floor should be first put in, which may consist of a piece of $\frac{1}{2}$ -in. plank laid on the keel, strengthened at each end by a cross-piece. By means of the latter it may be nailed into the shapes, and another piece across the middle may be added, which will not interfere with sitting.

The covering is best made of what is known by linen-drapers as "crash," strong and closely woven. It must be wide enough to go completely under the canoe, and can be had about

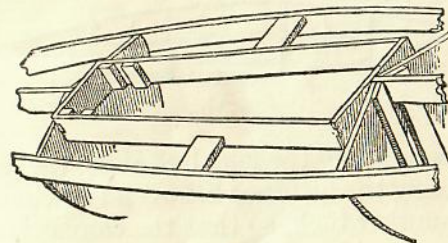


Fig. 10.

5 ft. wide, which will be quite wide enough. Seven yards of it will be sufficient.

To put on the canvas, turn the canoe over. Lay the canvas with the centre line along the keel. Stretch it well by pulling at each end, and tack it through the middle at the extreme ends with a few tacks in a temporary manner. Put in temporary tacks along the gunwale at moderate intervals, stretching slightly, and endeavour to get rid of all folds. Begin in the middle and work towards the end, and always pull straight away from the

CANOES, DINGHIES, AND PUNTS

keel, and not along the gunwale. Then put in a second set of tacks half-way between the first set of tacks on one side, pulling fairly tightly. Then on the other side put in tacks opposite to the latter, pulling as tightly as possible. The best way to do this is to seize the canvas with a pair of pincers, so that on pulling you can get the head of the pincers just over the gunwale, when they can be used as a lever to give an extra pull. A tack may then be put in on the outside of the gunwale. Half-inch galvanised tacks will do. Now remove the temporary set of tacks. To get rid of folds, which

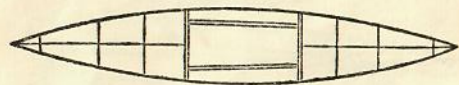


Fig. 11.

will not occur along the keel but along the gunwale, keep bisecting the distance between two consecutive tacks by another tack, so that the canvas is equally loose on each side of it, always now pulling the canvas as tightly as possible. In this way the folds will disappear, and the canvas be stretched tight and well fastened to the gunwale. Leave that portion within a foot of each end untacked. Next cut away all that portion which projects beyond the stem and stern post, turn the edges in, and tack along the edges at moderate distances. Bisect these distances, and these again, till you have a very close row of tacks, as in Fig. 12. Pull fairly tight, but not too tight, and do not use pincers for this part. Quarter-inch tacks will be best. The canvas for the top of the canoe in front of

CANVAS CANOE

and behind the well may be cut out and tacked on, lapping the edges over the side, as shown in Fig. 12, and enough canvas should be left to fill the part along the sides of the well, into which the canvas should be tacked with a fine row of tacks, afterwards being stretched over the gunwale. The canoe will now be completely covered in except the well. Before putting on the top, however, give the lower part outside a good coating of boiled linseed oil. This will be most of it absorbed into the canvas. The same may be done afterwards with the top. When this is dry—that is, after two or three days—give

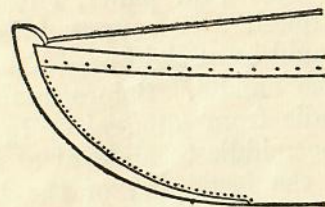


Fig. 12.

another good coating of the same. Then paint the canoe according to taste. Two coats for the bottom will be advisable, and paint which will stand water well should be used. It would be well to paint the framework with one coat before covering.

Make a stretcher for the feet (Fig. 13) of $\frac{1}{2}$ -in. board and slips to fit it into (Fig. 10), with stops on the floor. Also a backboard of $\frac{1}{2}$ -in. board to correspond (Fig. 14). Each piece in the latter may be 18 in. $\times$ 4 in. They should be nailed into two cross-pieces behind, so as to form a hollow for back, and should be placed 2 in. apart, to allow

CANOES, DINGHIES, AND PUNTS

a space for the spine. I prefer myself to fit in the backboard by means of stops on the floor and back of the well, making it keep one position, and that at a considerable slope, and have not found a swinging backboard so comfortable as some appear to have done.

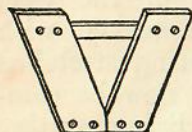


Fig. 13.

For the paddle, for which I think about 7 ft. 6 in. long over all is a good length, take a light, clean piece of yellow pine or fir $1\frac{1}{2}$ in. $\times$ $1\frac{1}{4}$ in., not more, and 6 ft. long. In the ends of this cut slots 6 in. long each, to receive two pear-shaped pieces of very light $\frac{1}{2}$ -in. plank, 1 ft. 3 in. $\times$ 8 in. Nail them through with copper nails if possible. The blades should be at right angles to the thickest direction of the handle. Before nailing in, shave down the handle from an oval of $1\frac{1}{2}$ in. $\times$ $1\frac{1}{4}$ in. for 2 ft. of the middle to an oval of about $1\frac{1}{8}$ in. $\times$ $\frac{7}{8}$ in. near the beginning of the blades. The handle should have its full thickness at the beginning of the blade, but should be well tapered off along the blade, so as to be quite thin at its middle where it ends. It should have its full breadth across the breadth of the blade. The blade itself may be shaved off thinner towards the edges. I do not think that for ordinary purposes any strip of copper or tin need be put round the blade, and the weight is increased by using it. The great thing about a paddle is that it should be as light as possible, and, if it appears able to stand it, it may be reduced still further. It may be

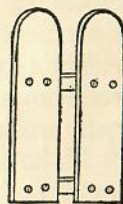


Fig. 14.

CANVAS CANOE

painted or varnished, all but two feet in the middle. I find no rings on the paddles necessary, and do not recommend them.

A short strip nailed outside the gunwale in the middle of the canoe is a good thing; it prevents wear from the paddle, and forms something to catch hold of in lifting the canoe. A short outer keel is also a good thing at each end to prevent wear; but in making holes for the nails through the canvas into the keel care must be taken to turn in the edges round each hole, to tack with a close circle of tacks, and paint well, so as to render the place watertight.

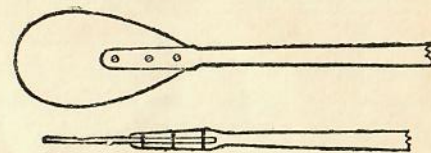


Fig. 15.

An apron is seldom wanted, but may be made of canvas rendered waterproof with boiled oil if desired. It is well to fasten some inflated bladders in each end, so as to make the canoe a diminutive lifeboat, in case of an upset or of a hole being knocked into her.

The canoe will now be ready for launching. The owner should learn to put her carefully into the water and take her out by himself—to carry her on his shoulder.

Superfluous wood may be cut from the central parts of the shapes, and also from along the keel towards the ends before covering the little craft.

CANOES, DINGHIES, AND PUNTS

The floor forms a considerable item in the weight, consequently this should be made no wider or thicker than necessary.

In learning to paddle, the young canoeist should remember to reach well forward and back with a good swing of the body from side to side. He will soon acquire by practice an easy style which will carry him quickly and pleasantly through the water, with no fear of a spill.

A SAILING DINGHY AND HOW TO BUILD IT

By D. F. McLACHLAN

THOSE boys who live on or near the sea-coast must have from time to time looked with delight at the numerous small handy sailing-yachts, which, steered by their owners, are constantly cruising about our firths and estuaries, and visiting the various watering-places and shipping towns round our British coasts.

Of late years small-boat sailing has secured a great hold among those who take an interest in yachting, and nothing has done more to effect this than the sailing dinghy, besides placing practical yachting within the reach of those whose limited incomes would otherwise have prevented them taking any interest in it.

A boat such as I am about to describe has all the advantages of the open boat, combined with the buoyancy and safety of the decked yacht. She will sail fast and tramp to windward like a one-rater, besides being about as handy a boat as anyone could wish for single-handed sailing; and for a coasting trip is far before an open boat or a canoe yawl.

Her length is 14 ft., and with a beam of 5 ft., which gives great stability, and a depth of 3 ft. 6 in., drawing about 2 ft. 6 in. of water, which allows her to enter most harbours even at low water.

In appearance she is very like the Una boat

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in having the mast stepped right forward, but is rigged with a standing lug, the best sail, in the writer's opinion, for all-round work.

She is clincher-built, with a round body and a deep fin-plate, the reason of the rounded body being that it is very much easier to plank a boat of this section, there being little shaping of the planks required in the run of the boat aft.

There are twelve strakes of planking on each

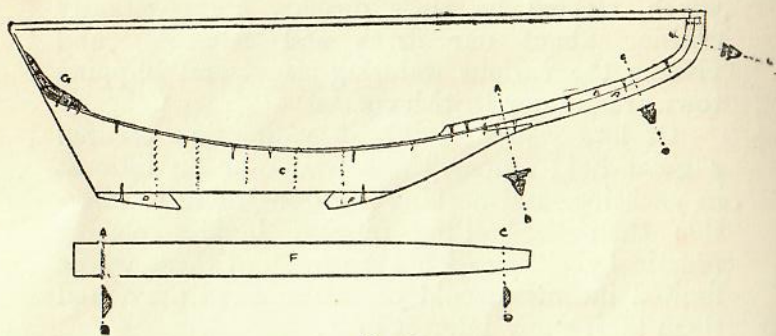


Fig. 1.

side of her, giving her a nice even form, and besides avoiding the severe bending which the planks would have to undergo if there were fewer strakes.

She has a large cockpit aft, which will accommodate three or four, and when on a cruise it can be covered up at night.

The floor being flat and her mast stepped forward, you will have a great deal more room than is usually found in a boat of her size.

But now let us proceed to the practical details for the construction of the boat.

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If you are fortunate enough to have a shed or outhouse to build her in, it will be a great advantage, though where such is not available she may be built in the open, provided the builder takes the precaution to cover up his work every time he knocks off.

The wood that you will require to start with will be as follows, which can be seen on Fig. 1.

Bow, piece of oak, A and B, Fig. 1.

Keel, piece of elm, c, Fig. 1, $2\frac{1}{2}$ in. thick.

Aft, piece of yellow pine, d, Fig. 1, $2\frac{1}{2}$ in. thick.

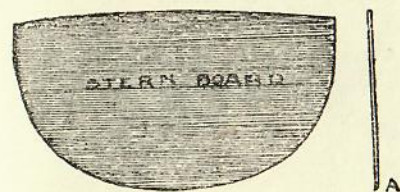


Fig. 2.

Fore, piece of yellow pine, e, Fig. 1, $2\frac{1}{2}$ in. thick.

Fore and aft piece, f, Fig. 1.

Stern board, oak, $\frac{5}{8}$ in. thick, Fig. 2.

Some pieces about 8 ft. $\times$ $\frac{3}{4}$ in. $\times$ $\frac{1}{2}$ in. of elm for the frames. You will also need a plank 17 ft. $\times$ 9 in. $\times$ $1\frac{1}{2}$ in. for odd jobs, and about 24 lengths of planking yellow pine. The best way to get this is to look round the saw-mill till you come across a log about 18 ft. that has a slight bend in it, say 7 or 8 in., and get it sawn into layers $\frac{1}{2}$ in. in thickness. In this way you will get your wood very much cheaper, besides saving a great deal of unnecessary shaping. Before ordering the material, you should get some

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thin wood or strong cardboard and make patterns of the pieces, A, B, C, D, E, F, and the stern board, which you can take to the mill, where they will cut them the exact size, and therefore save you a great deal of trouble later on.

Now to work. Get two old planks about the same length as your boat (staging planks do very well), and place them on the ground about 7 ft. apart, fixing the keel, c, in place by angle-pieces of wood, as illustrated, Fig. 3. At the same time you must be careful to set

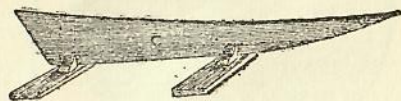


Fig. 3.

the keel perfectly upright by means of a plumb-line, otherwise she will be all askew and not steer. Try the bow piece, A, in place, and if the joint has been correctly sawn, it will fit exactly. Now dress it and shape it according to the thicknesses shown, Fig. 1, when you can bed the joint in white lead and screw it on firmly. Do the same with the piece B, meanwhile taking great care not to rack or twist A while doing so.

You should use $1\frac{1}{2}$ in. screws for screwing the two stems together, and 3 in. for screwing them to the keel; also be careful about the setting of them upright by the method previously mentioned, as when a boat gets a twist you can never rectify it, and it is there for all time coming.

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Your next step is the stern board, whose edges are bevelled to take the planking, as at A, Fig. 2, and is firmly screwed down to the keel by means of the knee-piece as O, Fig. 1, with $2\frac{3}{4}$ in. screws.

Take the 17 ft. plank and cut off a strip just over 14 ft. long and about 2 in. broad, and temporarily screw one end of it to the top of the stem and the other to the top and middle of the stern board, as Fig. 1, to carry your sections.

Bore two $\frac{3}{4}$ -in. holes, the first 2 ft. 3 in. from

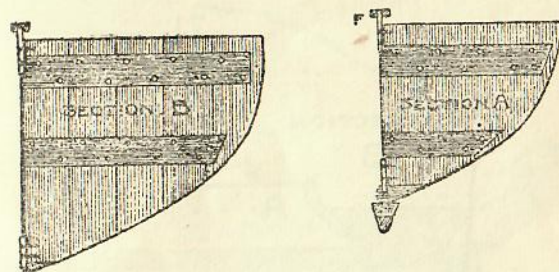


Fig. 4.

the bow, and the second 8 ft. These are for the sections to swing in. Take the piece F, and shape it to the thicknesses shown, fitting it in place on top of keel between the stern board and the bow piece, B, and screw it down with $1\frac{1}{2}$ in. screws. You can now plane it away until it comes in line with the bow piece.

Next drop your plumb-line down through the holes in the batten, and bore holes exactly below them, but only $\frac{1}{4}$ in. deep, in order to take the lower catches of the two sections, as at c, Fig. 4. The half-sections, A and B, Fig. 4, come next,

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and all you have to do is to enlarge from illustration to get the correct size. You will have to make them with catches of rounded hardwood, screwed into the top and bottom, so as to fit into the holes in the bottom and in the corresponding piece, F, Fig. 4, and enable the sections to swing from side to side. Any old wood will do for making the sections of, and if you can get an old packing box, so much the better, as they are taken out when the boat is planked.

Having by this time got your sections up,

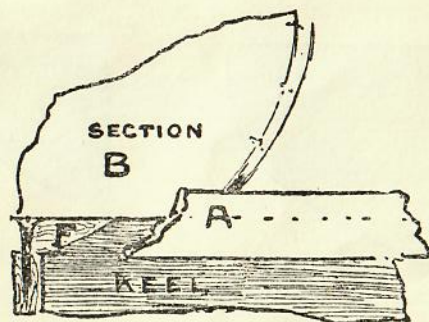


Fig. 5.

you can start the planking, which is more interesting, as you see the profile of your boat standing out as you progress with the work. As previously mentioned, she has twelve strakes of planking on each side, allowing for a lap of an inch for nailing purposes. You have to divide the girth of the sections and the stern board into twelve equal parts. Mark them with chalk, and swing them to the same side. In planking, you start with the bottom plank first.

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Take one of the pieces intended for planking and bend it round the sections, putting it over the bottom of F and up against the keel, as at A, Fig. 5, shaping the bottom edge to fit close against the keel and bow piece. Mark on the inside of the plank at the sections and stern board where the first spot occurs on each section and stern board.

You can take the plank off and plane it to the spots, taking care at the same time to form a nice even curve. Fit the plank on, and if it has been properly shaped it should fit exactly. Before finally nailing it on, place it on another board, and draw the shape on it for the bottom plank on the other side. This will give you both sides alike. You can now fit it on again and nail it down to the stem, keel, and stern pieces, using two rows of nails to the keel and stem, and one row in the stern board. In nailing planks start at the stem and, going along the bottom, finish at the stern.

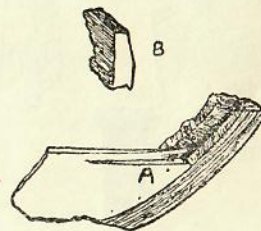


Fig. 6.

Swing back your sections and plane the top outside edge of the plank until it is about $\frac{1}{4}$ in. thick, as B, Fig. 6. This forms a bed for the next plank to lie on. Also at the extreme end of the stem and stern shape the top of the plank for about two feet back, as shown at A, Fig. 6, to allow the next plank to come flush and be nailed through it to the stem and stern.

Take the bottom plank intended for the other

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side, with the shape drawn out on it, and go through the same process on that side. Now for the second plank; take another board and put it in its intended place, making it overlap the bottom plank by about an inch, and mark off the spots as before.

Shape it and put it in place, holding it there by wooden cramps, which you can make for yourself by taking two pieces of hard wood about 13 in. long and joining them loosely at the centre by a bolt, as B, Fig. 7. A small wedge is driven in at the top, and thereby holds the two planks in position.

You can then nail the plank with four nails at the stem and three at the stern. Then start from the bow and mark off equal parts of ten

inches. At each of the spots drive in a $1\frac{1}{2}$ in. copper nail from the outside, and nail the two planks together, punching the heads of the nails well into the surface of the wood. You can now rivet them as follows. Cut $\frac{1}{4}$ in. off each nail-point, put a copper rove over it, as c, Fig. 7, and taking a punch with a hollow in it, as A, place it over the nail-point and strike several times with a hammer, at the same time getting some one to hold on the head of the nail outside. This will have the effect of driving

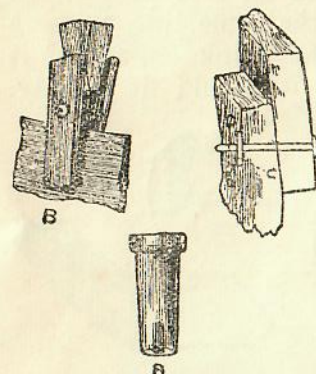


Fig. 7.

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the rove into the wood, and at the same time flattening the head of the nail over it. In this way you will get a very secure joint. The roves are got along with the nails, and are sold by the pound. The other planks are done in the same manner, only that you will not need to divide off your parts of ten inches, but simply drive in nails above those already in their places, in this way making complete rows of rivets right up the boat's side.

You will have to take care when doing the sheerstrake, which is the highest plank, to give it a nice curve on its top edge, as there are no planks above it to cover it.

After planking come the frames.

They will not need much steaming in this case, as the wood is only $\frac{1}{2}$ in. thick, and, in fact, it is only one or two aft and forward of the midship that you will require to steam at all. There are many ways of steaming frames, but the one I always use, and the handiest of all, is to get a piece of iron pipe about 10 ft. long, and wide enough to allow your frame to go in. Then midway between the two ends drill a $\frac{1}{2}$ in. hole.

Support your pipe on two sticks, and kindle a fire underneath it. Next put on a pot or tin of water to boil, placing a piece of zinc or sheet iron on the top with a $\frac{3}{4}$ in. hole in the centre of it, taking care that the hole in the pot lid is exactly below the hole in the pipe, and, putting your frame into the pipe, plug up the ends.

When the pot boils, the steam rises through the hole in the cover and goes into the pipe, where it has the desired effect of softening the frames.

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When your frame has been sufficiently steamed, take it out; and, catching it by the middle, bend it down into the boat at the stern exactly between the first two rows of nails, and nail it down to the part F. Towards the fore-end the bend will be too great for the frame to extend from side to side, and therefore it is not necessary to steam them, as they are simply pieces nailed to the planks at each side, as Fig. 8. In nailing

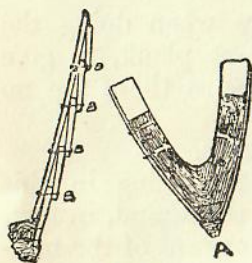


Fig. 8.

you drive a nail through each landing of planks, as at B, Fig. 8, nailing the frame and the two planks together, and riveting them as you did the planking. The frames can now be sawn off flush with the top of the sheerstrake.

Your next job is the gunwales, and for this you can saw two strips $1\frac{1}{2}$ in. square off your 17-foot plank.

On each side bend them into the curve of the boat 2 in. below the top of the sheerstrake, joining them forward at the bow; and butting them aft against the stern board, mark off the positions of your frames. You can take them out and carefully cut checks the breadth of your frames out of each at the side next the planking, to allow the frames to fit in neatly, and at the same time letting you screw them to both frames and sheerstrakes.

The gunwales are fastened with $1\frac{1}{4}$ in. screws, one screwed from the inside into each frame,

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and one from the outside between each pair of frames. Right forward in the bow screw down a piece of hardwood, shaped as A, Fig. 8, to top of gunwales and planking. This forms a great protection to the bow and forward part of the boat, and prevents any twisting. By this time you can now turn your attention to the watertightness, as when you get the deck on you cannot do much to that from the inside.

Get some marine glue (it can be obtained at any ship-chandler's) and heat it over a slow fire, taking care not to let it boil, and pour it into all the seams of the boat; in this way the glue will find its way between the planks and make a watertight joint. After the glue has hardened, a coat of white paint should be given it inside. The planks that project past the stern board can now be cut off flush with it. You had better also get the bolt holes bored in the keel. Mark off the positions of them as shown on Fig. 1, and bore them right through from the inside with a $\frac{5}{8}$ in. auger, taking care that the holes are plumb.

She should by this time be ready for the deck beams, of which there are five. Their positions can be obtained from the deck plan, Fig. 9. You will notice that the one that is screwed to the inside of the stern board has a check $\frac{1}{2}$ in. deep taken out of the front of it, and also rises $\frac{1}{2}$ in. above the stern board; in this way it binds the ends of your deck planks together, and gives a better finish. The rest of the beams are fitted between the frames, so as not to weaken the gunwales too much at one point. After the positions have been marked off, patterns should

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be made of thin wood the exact length of each beam, and also cut to the curve shown, to which all your beams should be made. You can now take them to the saw-mill and get the beams cut out of 2 in. wood, and at the same time leave an order for the wood you will yet require, which is as follows:—

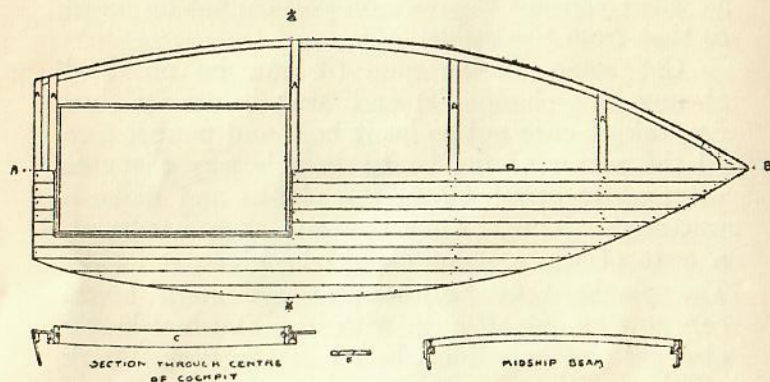


Fig. 9.

One piece 3 ft. 9 in. $\times$ 18 in. $\times$ $\frac{5}{8}$ in. for cockpit seat, yellow pine.

Two pieces 7 ft. $\times$ 22 in. $\times$ $\frac{5}{8}$ in. for cockpit seats, yellow pine.

One piece 12 ft. $\times$ 12 in. $\times$ $\frac{1}{4}$ in. for floor boards.

Four pieces 12 ft. $\times$ 4 in. $\times$ $\frac{1}{4}$ in. for floor boards.

Twenty-two lengths of 3 in. $\times$ $\frac{3}{8}$ in. planking for deck, yellow pine.

One piece 4 ft. 6 in. $\times$ 12 in. $\times$ $\frac{3}{4}$ in. for helm.

Two pieces 5 ft. $\times$ 5 in. $\times$ $\frac{5}{8}$ in. for cockpit coaming.

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Two pieces 2 ft. 6 in. for cockpit coaming fore and aft.

Then you will need the following for the spars, which should be the best yellow or red pine.

One piece 14 ft. $\times$ $3\frac{1}{2}$ in. square for mast.

One piece 14 ft. $\times$ $2\frac{3}{4}$ in. square, for boom.

One piece 13 ft. $\times$ $2\frac{1}{2}$ in. square, for gaff.

I have shown one beam, which is the mid-ship (Fig. 9), but would advise you to take the breadths from the positions marked on the boat, as they have to fit exactly.

They are 2 in. deep, with the exception of the one on the stern board, which is $2\frac{1}{2}$ in., to allow it to come up to the level with the deck planking.

At each of the places marked on the gun-wales fit in the corresponding beams, and screw them down with a 3 in. screw at each side. Having got all your beams in, you should now fit in your floor boards, as you cannot do anything of use once you get the deck on. Take the piece 12 in. broad and taper it away at one end until it is about 8 in., then place it in the centre of the boat, the broad end against the stern board, and screw it down to the frames by two $\frac{1}{2}$ in. screws in each frame. The four 4 in. pieces are attached in the same manner, two at each side, with 3 in. spaces between them. You may as well at this time put in the mast step, which is a piece of the $1\frac{1}{2}$ -in. wood 12 ft. by 4 in., with a $1\frac{3}{4}$ -in. hole cut in it, and then screwed down to the bow piece, B; the centre of the hole being 2 ft. 4 in. from the front of stem head. Coming now to the cockpit seats, a short stringer, 5 ft. 6 in.

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× $1\frac{1}{2}$ in. square, is run along the inside of the frames, starting about 2 in. from the stern board, to take the ends of the stern seat and the sides of the side seats, and screwed to the frames about 1 ft. below the top of the gunwales. Take the small seat and fit it on top of the two stringers and against the stern board, and fasten it with two screws at each end. The side seats are put in in

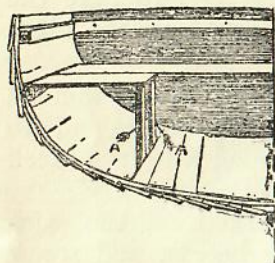


Fig. 10.

the same manner, the only difference being that you will require a couple of supports at the front of each to hold them up, as A, A, Fig. 10.

By this time you can think of getting the keel finished. Lift the boat out of the supports and fit on the fore and aft keel pieces, D and F, Fig. 1, and, taking a stick dipped in black paint, push it through the bolt holes from the inside, thereby marking off their positions. At each of the spots marked off, bore a hole right through with a $\frac{5}{8}$ -in. auger, push the bolts up from below, and putting a good big iron washer over the end of each inside, to prevent the nut sinking into the wood, screw them tight. The bolts should be $\frac{5}{8}$ in. × 1 ft. 3 in. and 1 ft. 9 in., and have round heads.

You should now make an exact pattern of the space left between D and E out of 2-in. wood, and marking off and boring the bolt holes, as previously, take it to the foundry, where they will cast you an iron keel exactly the same for

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five or six shillings. You should then give it a coat of red lead, to preserve it, and bolt it on as you did the keels. She can then be put back into the supports again, with the front one raised up a little to keep her level. Before decking her you should get the cockpit coaming fitted in. First mark off the breadth of the cockpit on beams Nos. 3 and 4. Then cut the 5 ft. pieces to the shape, as C, Fig. 9, and fit them in between the beams, taking care that they are a good fit, otherwise they will weaken the deck planking of the boat; each of the pieces are then screwed from the other side of the beam by a 2 in. screw at each end.

Now take the two end pieces and fit them in between the pieces running fore and aft, and against the beams, as B, B, Fig. 9, and fasten them in similar fashion to the other pieces. The four sides should project above the beams by about $2\frac{1}{2}$ in.

You can now start the deck planking. Take each of the planks and chamfer the corners of them as F, Fig. 9, for about $\frac{1}{4}$ in., to allow for the caulking. Mark off the centre of the stern board, and drive in a nail with a piece of twine attached to it; put in another nail at the stem, drawing the twine tight, tie it round the bow nail, and you have the centre of the deck. Take one of the deck planks, and, cutting it the correct length, fit it in place against the twine, as D, Fig. 9, and screw it down to the beams and sheerstrake with $\frac{3}{4}$ in. screws, two in each beam. Having got on the first plank, you had better mark off the position of your mast hole, the centre of which is about 2 ft. 5 in. from the front of the stem. You

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can leave the planks projecting slightly over the sheerstrake, and when you have them all on you can plane them flush with the sheerstrake.

The mast hole should then be drawn out by putting the leg of a pair of compasses at the centre marked, and describing a circle of $1\frac{1}{2}$ in. radius, which will give you a mast of 3 in. diameter; the hole should then be cut out with a bow saw. As to the making of your deck watertight, it is a matter of taste whether you caulk or canvas it; but in a job of this kind you do better, I think, to caulk it, as after your experience with the sides of the boat you will probably find it easier. Melt the marine glue again, and while it is still hot pour it into the seams and round the coaming of the cockpit, filling up the chamfers in a line with the deck. When the glue is dry you can go over it with a small hand plane and take all the superfluous glue off, leaving a nice smooth surface, which, if you have followed the instructions, should be perfectly watertight.

You can now put a $\frac{3}{4}$ in. moulding round the coaming, to further prevent the water finding its way through; this finishes off the woodwork of the deck, and you can now turn your attention to the caulking of the hull. The two bottom planks and the keel only will require caulking, and this is easily done by leaning the boat over on its side and hammering thin cotton wick into the seams with a caulking tool.

The wick can be got at any marine store, and you had better tell them what it is for, to make sure of getting the proper kind.

The finplate, or wooden keel, can now be

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planed away forward, and also reduced a bit in thickness till it comes in line with the metal keel, which is half an inch thinner. The hull is now nearly finished, and only needs the helm and a few things to finish it. The shape of the helm should be drawn out on the wood and then sawn round with a bow saw. You will notice

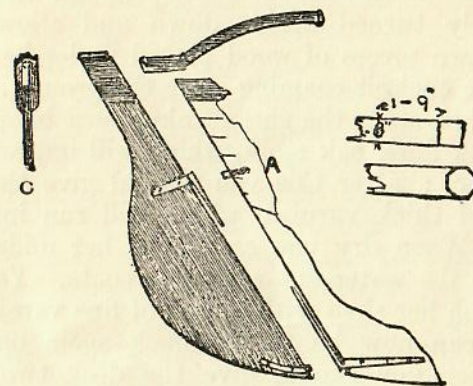


Fig. 11.

that the head is made up of three pieces, two side ones that are screwed to the side of the helm, and a piece fitted in between them at the top, as c, Fig. 11, leaving a hole 2 in. by $1\frac{1}{2}$ in. for the tiller to fit into. The galvanised pintles and eyes can now be fitted.

The long pintle is screwed to the finplate at the bottom; and about 2 ft. 6 in. up from this in the stern board an eye is put in, as A, Fig. 11. In the helm the eye corresponds with the bottom pintle, and the helm pintle with the eye in the stern board. The reason for fitting a long

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pintle on the boat at the bottom is that if the helm has got to come off while the boat is in the water, it is much easier to put it back in its place again. The tiller is sawn out of a $1\frac{1}{2}$ in. board, and if made of mahogany looks very well; it is shaped to fit into the hole in the head of the helm, and should be about 2 feet long.

The helm should be unshipped and the boat completely turned upside down and allowed to rest on two pieces of wood placed under her deck to let the cockpit coaming clear the ground. You should then stain the sheerstrake stern board and helm with dark oak stain, which will improve her appearance; after this you should give the hull a coat of thick varnish, which will run into the seams. When dry you can paint her underbody white to the water-line with two coats. You can then finish her shell with a coat of fine varnish.

She can now be turned back again on even keel, when you should give the deck two coats of varnish inside and out, including cockpit seats, etc.

You can now safely say you have the hull finished, and must abandon her for a time to look after the rigging.

The question of spars are our next consideration, and of these there are three. Take the piece of $3\frac{1}{2}$ in. wood that you have laid aside for the mast, and mark off the centre or heart of it at each end, as illustrated; you next mark off the thicknesses of the spar by describing a $1\frac{1}{4}$ in. circle at one end and a $1\frac{3}{4}$ in. at the other, these being the diameters when finished at top and bottom.

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Measure up 1 ft. 9 in. from the thick end, and draw a line round it, as shown; this being where it passes through the deck, and is the exact 3 inches.

Next plane the corners of the spar, making it octagonal in section; and in this form it is shaped to its required thicknesses, always turning it round, taking one side after the other till you have it the diameters marked off. When this has been done you can take a hand plane and round the corners; this will have the effect of making it nearly a complete circle, when with a spokeshave the spar can be gone over and afterwards rubbed up with rough sandpaper. The two remaining spars are done in the same manner, and, when made, each spar should get a coat of good varnish, to preserve it from the weather. The fittings, sailcloth, etc., can now be ordered. I have shown drawings of these, so all you have to do is to enlarge them. The following is the list of things required:—

1. Seventeen fathoms rope (fathom = 6 feet) to bind sail with, also $1\frac{3}{4}$ in. rope for halliard, mainsheet, and stays; 18 yards of thick codline, to lace sail with; 12 yards of sailcloth (fine), 36 in. wide—you should pay about eightpence per yard for it; 1 yard of $\frac{1}{8}$ in. wire-rope, to fix pulley to foot of mast.

Some whipcord for making beackets on ropes round thimbles, which are made by bending the rope round the thimble and whipping the ends together as A, Fig. 12.

2. Fixtures for shrouds which are put on to sheerstrakes. Plate with eye on it for gaff,

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B, Fig. 12; three iron cleats, 7 in.; two screw eyes $1\frac{1}{2}$ in., and one 3 in.; two small ring-bolts for mainsheet.

3. $2\frac{1}{2}$ in. pulley blocks; boom holder and ring, as C, Fig. 12; a few $\frac{3}{4}$ in. thimbles, as D, Fig. 12; band $2\frac{1}{4}$ in. inside diameter, with four

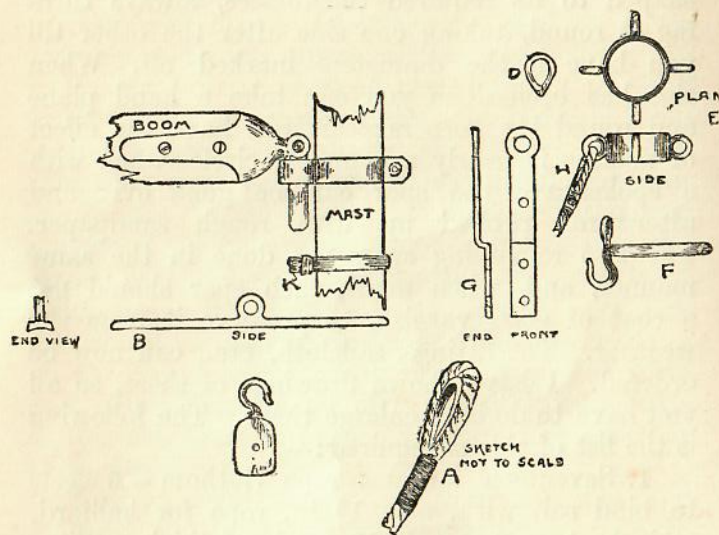


Fig. 12.

eyes on it, for the mast, as E, Fig. 12; a traveller, F, Fig. 12, of $3\frac{1}{4}$ in. inside diameter, with a hook on it to run up the sail on.

You will also need a band of galvanised iron for the front of the stem. This can be got to suit an ordinary rowing boat, and is easily bent to the shape.

You can now cut the $1\frac{3}{4}$ in. rope into five

SAILING DINGHY

different parts, as 35 ft. for halliard, two pieces 15 ft. for stays; 16 ft. for forestay, and 20 ft. for mainsheet. The fixtures, G, Fig. 12, that the stays are fastened to can now be put on. They are fastened by screws and bolts to each side by putting a $1\frac{1}{2}$ in. screw through the sheer-strake into the gunwale, and two $1\frac{1}{8}$ in. bolts into the lower planks on each side all screwed up tight. The fore-stay is fastened through a hole in the top of the band that binds the stem. The head stays are fastened to the band at the top of the mast by thimbles put through the eyes, and the rope becketed round them, as H, Fig. 12.

About 9 in. above the deck you can fasten the ring for the boom to the mast.

Next fix one of the $2\frac{1}{2}$ in. blocks 4 in. below the boom ring, by winding the thin wire round the mast, as Fig. 12. Now take another pulley and hook it on to the band at the head of the mast, as K, Fig. 12. Run the halliard through it and becket it on to the eye of the traveller; lead the other end through the pulley that is fixed to the foot of the mast, and you can now set the mast in position. The plate with the eye on it, B, Fig. 12, can now be put on to the gaff by whipping it on with the codline; the eye is about 4 ft. up the gaff.

The cleats and ring-bolts come next, the positions of which you can get from the sketch of the deck plan in Fig. 13.

Holes will require to be bored for the bolts, and the bolts pushed through, when the nuts can be put on and screwed up. (The cleats are fastened with two bolts).

CANOES, DINGHIES, AND PUNTS

Having got the fittings on, you should now be ready to start your sail. The cloths are 36 in. wide, and should be cut up exactly through the centre into two strips 18 in. wide. The pieces

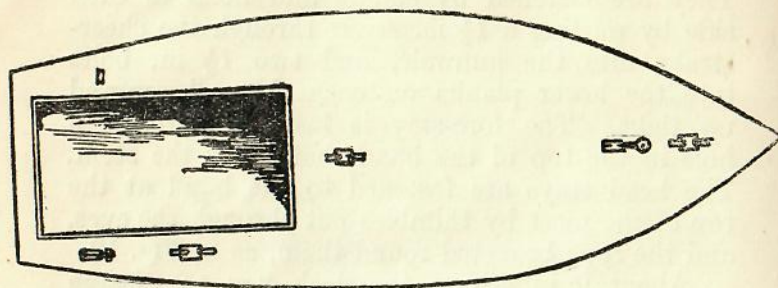
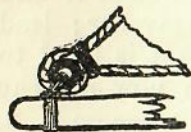


Fig. 13.

should then be sewn together, making a hem about 1 in. broad, with three rows of stitching on it. After this has been done, the exact size of your sail should be marked off on the floor, and the cloths cut to fit it, allowing 3 in. all round for a strong hem.



A

Fig. 13A.

After the sail has been made, it should be edged all round with the rope, and crinkles put in in the usual way, as A, Fig. 14. There are six crinkles on the sail, one at each corner and one at each end of the row of reefs.

Now take the sail and lash it to the boom at the corners by some of the codline, as shown at A, Fig. 13A, and do the same to the gaff, but in addition to this you must lace the sail to it all the way.

SAILING DINGHY

The sail can now be set. Hook the gaff on to the traveller and hoist up your sail, making

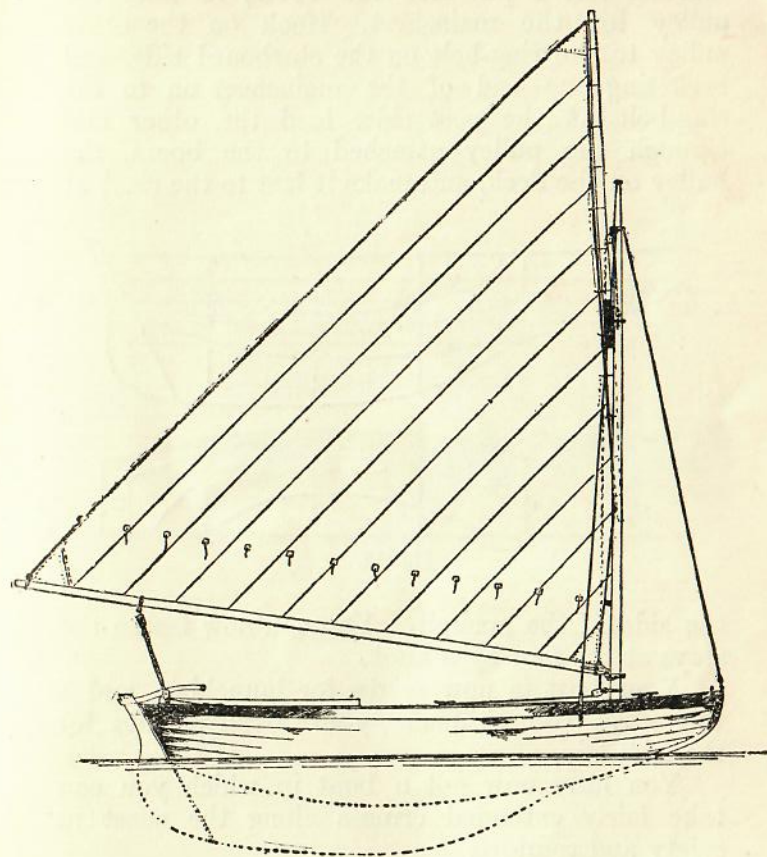


Fig. 14.

your halliard fast to the cleat in front of the cockpit. A screw-eye should be put in the boom

CANOES, DINGHIES, AND PUNTS

about a foot from the end, to take the reef crinkle, when you are sailing under reefed canvas. Another one is put into the boom, to take the pulley for the mainsheet. Hook on the other pulley to the ring-bolt on the starboard side, and becketing one end of the mainsheet on to the ring-bolt at the port side, lead the other end through the pulley attached to the boom, the pulley on the deck, and make it fast to the cleat at

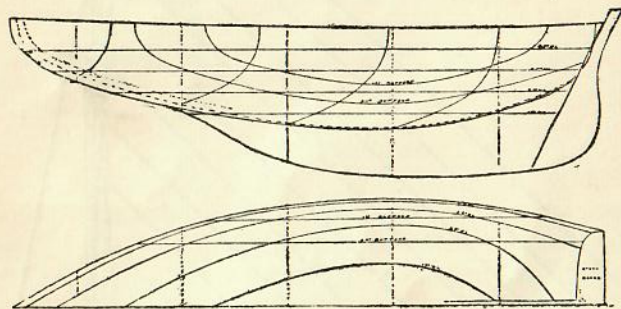


Fig. 15.

the side of the cockpit. You can now fasten the stays at the foot by a knot.

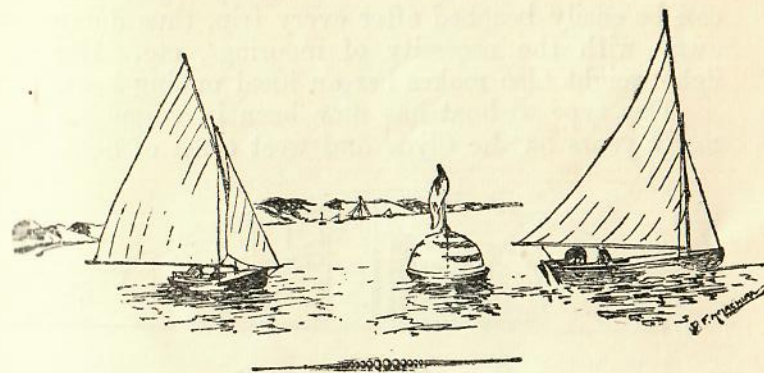
Your boat is now ready for launching, and I will leave you to make your arrangements for the trial trip.

You have now got a boat in which you can take fairly extended cruises along the coast in safety and comfort.

Your boat will either run or beat to windward and stand weather that will frighten any open boat in your district; and no matter where you intend sailing your dinghy, whether down

SAILING DINGHY

south, on Thames or Solent, or up north on the open waters of the Clyde, you will have a boat in which you will not only have many pleasant cruises, but will also do credit to yourself and to the instructions that I have here given.

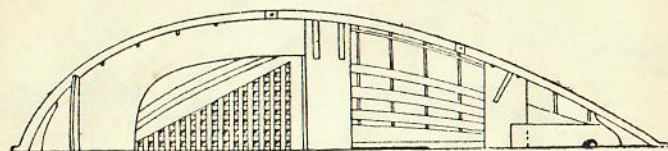


A BOY'S OWN SAILING SKIFF

By D. F. McLACHLAN.

BOAT-SAILING, especially in the small classes, has of late become very popular, and nothing has done more towards this than the introduction of the small centreboard skiff. She is very light, and can be easily beached after every trip, thus doing away with the necessity of moorings, etc. Her light weight also makes her an ideal pulling boat.

This type of boat has now been in vogue for many years on the Clyde and west coast of Scot-



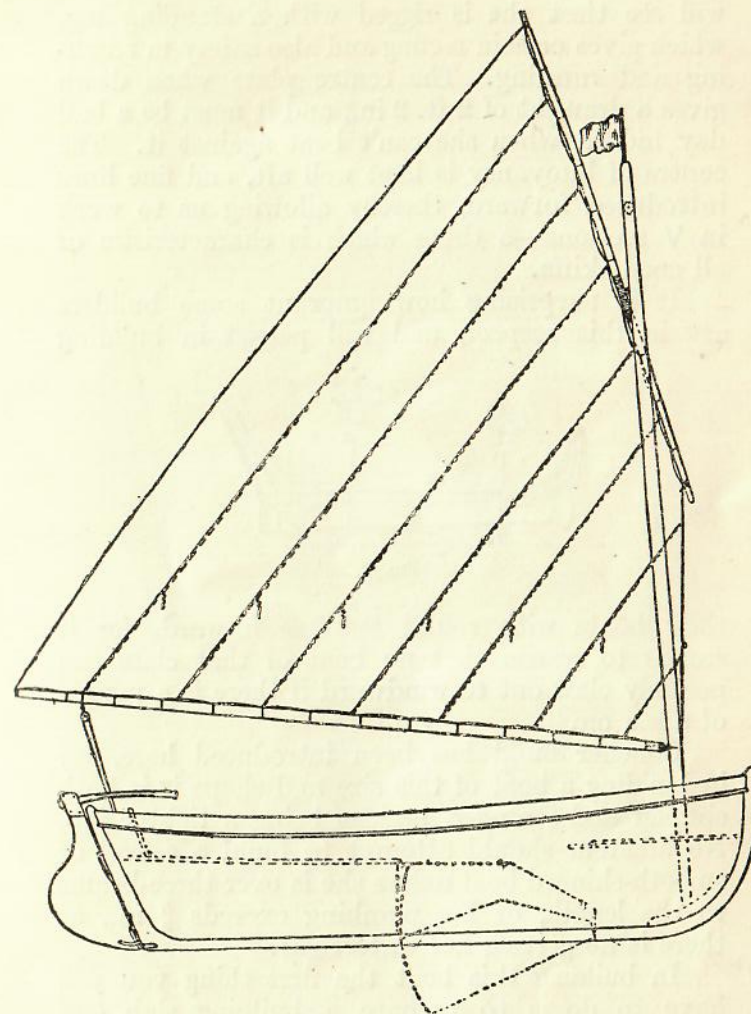
— PLAN —

Fig. 1.

land, and its weatherly qualities are there well known. The great advantage of the skiff—as any Argyllshire fisherman will tell you—lies in the fact that as long as a bit of a sail can be kept on them they will go to windward.

In designing a boat for readers of this handbook, this has all been thought out, and I think I can safely say that, with air-cases aboard, you have got as seaworthy and handy a boat of her size as it is possible to get.

By looking at the rigging plan (Profile) you



— PROFILE —

CANOES, DINGHIES, AND PUNTS

will see that she is rigged with a standing lug, which gives ease in reefing and also safety in reaching and running. The centre plate when down gives a draught of 2 ft. 2 in., and it must be a bad day indeed when she can't beat against it. The centre of buoyancy is kept well aft, and fine lines introduced forward, thereby allowing us to work in V sections—a thing which is characteristic of all good skiffs.

It is surprising how ignorant some builders are in this respect, and will persist in building

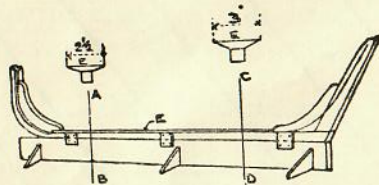


Fig. 2.

their boats with round sections forward, for it stands to reason that no boat of that class can possibly claw out to windward if there is a popple of a sea on.

Clincher build has been introduced here, for in building a boat of this size and shape it is both simpler and stronger, besides being a tighter job. No amateur should attempt to build a carvel or smooth-skinned boat unless she is over three-beams to the length, or her planking exceeds $\frac{5}{8}$ in., as there is no getting her watertight.

In building this boat the first thing you will have to do is to prepare a building slab (see Fig. 2). This can be an old staging or scaffolding plank set up on end, as shown. The keel should be

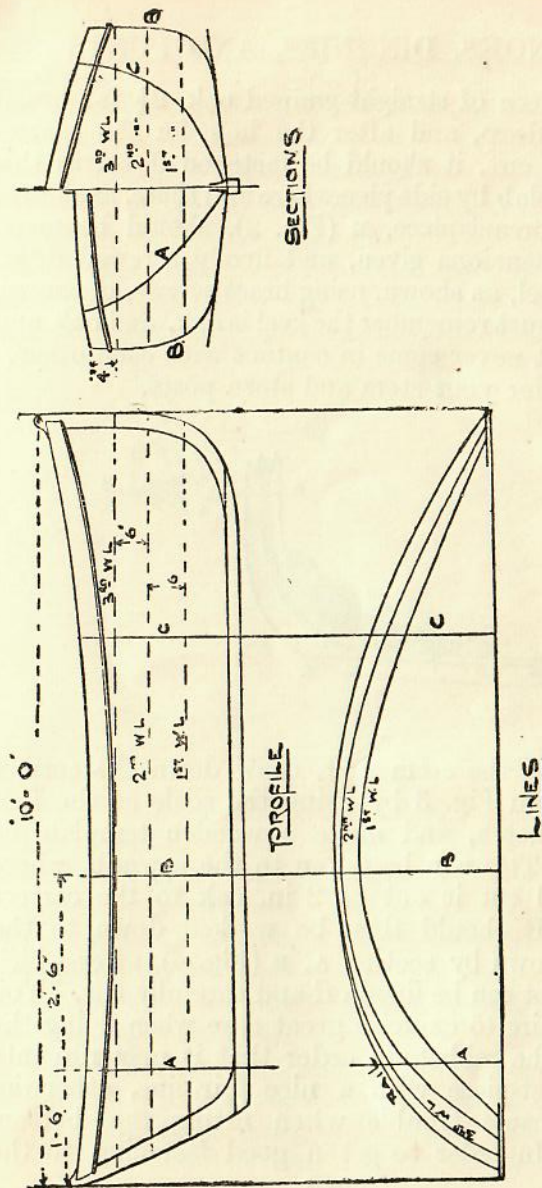


Fig. 3

CANOES, DINGHIES, AND PUNTS

a good piece of straight-grained oak, $2\frac{1}{4}$ in. broad $\times$ 2 in. deep, and after the hole for the centre-board is cut, it should be fastened down to this building slab by side pieces here and there, as shown.

The breast-piece, E (Fig. 2), should be made from dimensions given, and firmly screwed down to this keel, as shown, using brass screws, of course, for you must remember the keel is oak, and oak and iron must never come in contact with each other.

Now for your stem and stern posts.

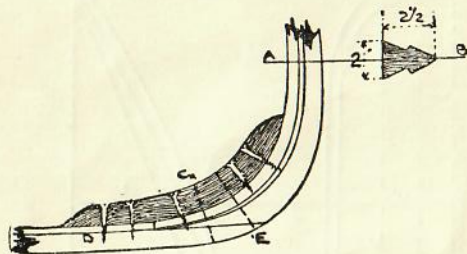


Fig. 4.

Taking the stem first, draw down the correct shape from Fig. 3 by using the scale at the foot of the sketch, and make a wooden template or mould. This can be taken to the sawmill, where they will cut it out of 2 in. oak to the correct shape. It should then be worked down to the shape shown by section A, B (Fig. 4), after which the rabbet can be lined off and carefully cut. You will require to exercise great care when doing the foot of the rabbet, in order that it may run into the breast-piece with a nice fair line, otherwise it will cause trouble when fitting the bottom plank. In order to get a good fastening to the

SAILING SKIFF

keel a deep knee has to be fitted (c, Fig. 4). This will require to be checked out in way of the breastpiece, as shown at D (Fig. 4).

When all is finished and ready for erecting, first start by fastening the stem to the knee-piece with heavy brass 4 in. screws, and then, after plumbing and adjusting your stem carefully, whitelead the scarph, and firmly screw the whole

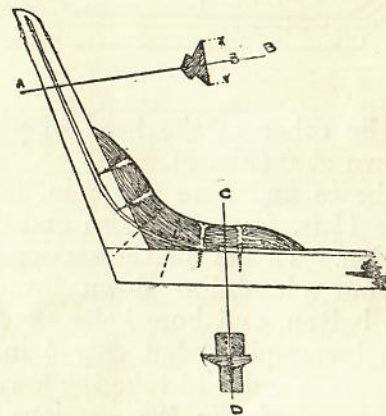


Fig. 5.

thing down on to the breast-piece, as shown. A $\frac{1}{4}$ in. auger should now be taken, and two holes bored right through the knee-piece and stem, and knee-piece, breast-piece, and keel, and pieces of $\frac{5}{16}$ in. rod brass should be firmly hammered in, as shown at E (Fig. 4).

The stern-post is done in precisely the same manner, the dimensions for which can be got from Fig. 5. The same thing applies here when cutting the rabbet, and you will require to make a neat

CANOES, DINGHIES, AND PUNTS

job of it where it crosses the knee or deadwood. You should give this a nice sweep, as it adds greatly to the appearance of the boat (see Fig. 5).

Next take a long batten, fairly stout, about 3 in. $\times$ 2½ in., and nail one end to your stem-

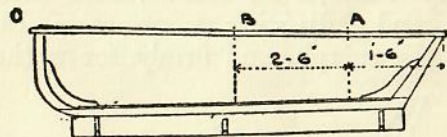


Fig. 6.

head, and the other to the head of your stern-post, as shown at c (Fig. 6).

Take a brace and bore two $\frac{3}{4}$ in. holes in it, the first one 1½ ft. from the stern and the second 4 ft., as shown. This is for the sections to swing in. Drop your plumb-line down through these holes in the batten, and bore holes exactly below them in the breast-piece, but only $\frac{1}{4}$ in. deep, in order to take the lower catches of the two sections, as at A (Fig. 7).

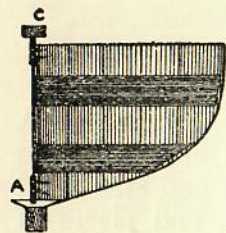


Fig. 7.

The half sections A and B (Fig. 3) have now got to be made, and all you have to do is to measure them off by using the scale given. They can be built up out of any old wood, such as an old packing-case, for

when the boat is planked they are of no more use, and are taken out. These sections must be able to swing clear from side to side, and be kept perfectly plumb and rigid.

SAILING SKIFF

When you have got them up in place, and everything so far to your satisfaction, you can make a start with the planking, which will be more interesting to you, as you will see the shape of the boat standing out as you progress with the work.

She is planked with 11 strakes each side, the top one being mahogany or teak. You will first require to divide the half girth of the boat at the sections into 11 parts, 10 being equal, and the top one $\frac{1}{2}$ in. deeper. When this is done the stem and stern posts should be divided off on both sides. When buying your wood at the sawmill for the planking, it is best to get it in 16 in. or 18 in. breadths, in which case you will nearly always be able to get a couple of strakes out of each board. As regards length, you will want them 12 ft., and they should be $\frac{3}{8}$ in. thick off the saw, which will give about a $\frac{1}{4}$ in. full when finished.

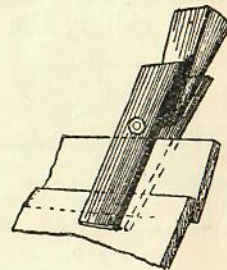


Fig. 8.

Before planking you should make yourself a few wooden cramps, as shown at Fig. 8. These are simply two pieces of wood about 12 in. long $\times$ 3 in., held together loosely by a bolt. A small wedge, you will notice, is driven in at the top and firmly holds the plank in position.

Having got the cramps ready, take one of your boards and rip 6 in. off it. This is intended for the sandstroke or bottom plank. Bend it round the sections, keeping it hard up on the breast-

CANOES, DINGHIES, AND PUNTS

piece, as shown at Fig. 9. Hold it there with the wooden cramps, and mark off approximately what the line of the rabbet at the forward and aft ends will be, taking care to leave it full, and also where each spot comes in the way of the sections. Take it off now and work it to shape. In this plank there should be very little shape and the top edge will be practically straight.

Before finally nailing it on, place it on another board, and draw the shape down for the bottom plank on the other side.

In nailing the ends of the planks to the stem and stern posts, a double row of 1 in. nails should be used. The holes should be carefully bored beforehand, as it is very easy to split the planks, especially if they have to bear the strain of a heavy twist.

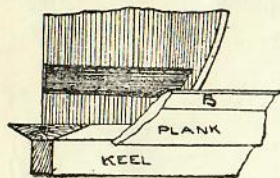


Fig. 9.

As regards fastening the bottom strake to the breast-piece, a single row of 1 in. nails is sufficient, but be sure to clinch them on the inside.

Having now got the bottom plank securely fastened in place, swing back the sections and take a few shavings off the top edge to fair it up, for it is the top edge of this plank that gives you the line for the bottom of the next, and nothing looks worse in a clincher boat than unfair landings. At the same time take a shaving or two off the top outside edge, as shown at B (Fig. 9), in order that the next plank will get a good bearing. Referring to Fig. 10, you will notice that at the fore and aft ends the top edge of the planks for

SAILING SKIFF

a distance of about 8 in. have to be cut away, as shown. This is to enable the strake above to come flush, and, at the same time, to be nailed through it.

Now for the second plank. Take the remains of the board which the sandstrake was cut from, and place it in its intended position, allowing it to overlap the bottom plank by about an inch at midships. Hold it in position with the cramps, and mark off the spots

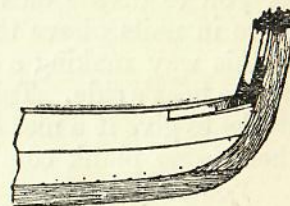


Fig. 10.

as before. After this it can be shaped to fit, and nailed up. You should space the nails in the landings at 8 in., centre to centre, as there is a timber or frame coming in between the two. At each of the spots you have marked off for nailing drive in a 1½ in. nail from the outside, meanwhile holding on in the inside with the head of a heavy hammer in order to bring the two surfaces close together.

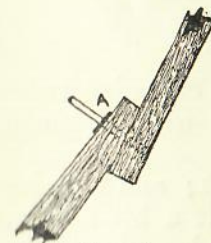


Fig. 11.

They should then be riveted as follows: Place a copper rove over the nail, as A (Fig. 11), and, taking a small piece of hard wood, such as beech, place it over the nail point and strike it several times with a hammer, taking care at the same time to hold on to the head of the nail outside.

The points of the nails can then be cut off and

CANOES, DINGHIES, AND PUNTS

riveted over the rove with a light hammer. These roves can be bought along with the nails, and are sold by the pound.

As for the other planks, they are done in the same manner, only that it will be unnecessary for you to divide off the nail spacing, but simply drive in nails above those already in their places, in this way making a complete row of nails right up the boat's side. Take care when doing the sheer-strake to give it a nice fair curve on its top edge, as there is no plank coming above to cover it.

You may perhaps want to scarph some of the

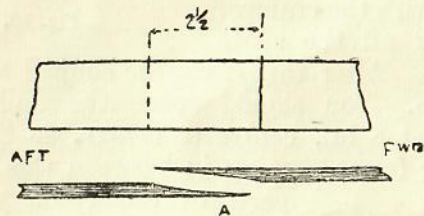


Fig. 12.

planks, especially where you have excessive twist and shape, in order to do away with as much cross-grain as possible.

The scarphs should be a good fit; and in order to ensure this, they should be left a bit hollow, as A (Fig. 12). The breadth or lap should be $2\frac{1}{2}$ in. long, and no more, as the longer you make it the worse it is to get tight, owing to the small taper. Scarph tacks $\frac{3}{4}$ in. and $\frac{7}{8}$ in. should be used for this job, taking care to clinch them inside.

Don't let the scarphs in adjacent strakes come nearer than four or five feet, and in practice it is nearly always better, especially in topsides, to

SAILING SKIFF

have one strake running the full length of the boat between any two scarphed ones.

Having got the planking finished, it would be better at this stage of the work to make and fit the centreboard case, as after the boat is fitted up it is not easy to get free access to work. Fig. 13 shows a sketch of the case, the end being left open to show the construction.

First make the coaming, A, which should be 6 in. high and $1\frac{5}{8}$ in. thick, and firmly screw it

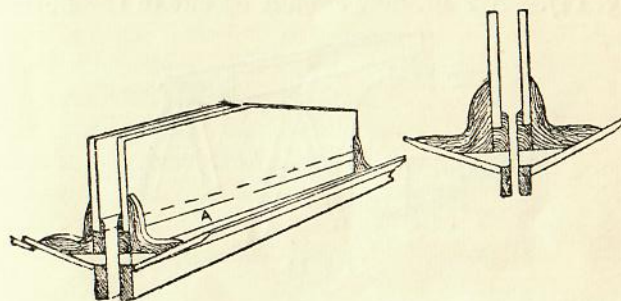


Fig. 13.

down to the breast-piece on a layer of white lead. You should make this a good fit, otherwise it will be leaky, and if you are not quite sure about it, then screw it down on a layer of felt instead of white lead. The sides of the case should extend up to a height of about 16 in., this being afterwards planed down to the height of the thwarts, or cross sides. You will notice there are two oak knees fitted each side to stiffen it and take any lateral strain. These should be 1 in. thick at least, and extend for about 9 in. up the sides. The fore and aft ends are $\frac{3}{4}$ in. thick, screwed on with snap-

CANOES, DINGHIES, AND PUNTS

head screws on a layer of white lead. As for the top, most of this will always be above the water-line, so you can leave it open for some distance.

After this come timbers, and in this case you will require to use steam, as otherwise you would split most of them.

A steam-box will have to be made; but this is a simple thing, consisting of a long box 9 ft. $\times$ 12 in. $\times$ 8 in., with one end open for drawing the timbers as you happen to require them (see Fig. 14). A 2 in. hole should be cut in the bottom

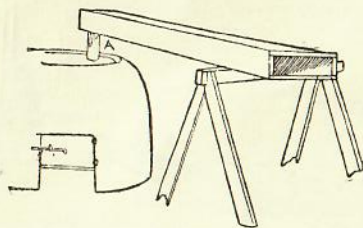


Fig. 14.

of it, and a short piece of pipe inserted, as shown at A (Fig. 14).

This can then be placed over any washhouse boiler, the other end being supported as shown. The timbers should be of elm, $\frac{5}{8}$ in. $\times$ $\frac{1}{2}$ in., rounded on one of the broad sides, and should be got in lengths of about eight or nine feet. When all is ready, place the timbers in the box, cover the open end with an old bag or piece of thick canvas, and, if the water in the boiler be boiling, then in about a quarter of an hour they will be ready for bending.

In fitting them start from midship, and work fore and aft. At the extreme ends the bend will

SAILING SKIFF

be too great to allow the timber to extend from side to side in one piece, and therefore will require to be fitted in halves. In nailing you drive a nail through each landing, as A (Fig. 15), thereby nailing the two planks and the frame together, and clinching them meanwhile on the inside as you go along.

Don't hurry this part of the work, but fit and fasten each timber carefully, and make sure that when the nails are driven in from the outside they come fair through the centre of the timber, not out at the side. In this way you will be sure to get them all in without splitting. Now take a tenon-saw and cut the heads off the timbers at $1\frac{1}{4}$ in. below the top of the sheerstrake, so as to make room for the gunwales, which will now have to be fitted.

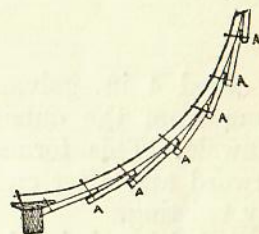


Fig. 15.

These gunwales are $1\frac{1}{4}$ in. by $1\frac{1}{4}$ in. elm, tapering in breadth forward to 1 in. and aft to $\frac{7}{8}$ in., and will require to be kept in the steam-box for some considerable time, owing to the excessive twist which they take aft, and therefore you don't want to put an undue strain on the sheerstrake. Allow them to run for the full length of the boat, butting them forward at the stem-head and aft at the stern-post. They should be fastened with stout $3\frac{1}{8}$ in. copper nails driven in from the outside and clinched in the inside.

Forward and aft at the extreme ends of the boat

CANOES, DINGHIES, AND PUNTS

a knee will require to be fitted to stiffen her up, as shown at Fig. 16. These should be natural bends of larch if possible, and should be fastened

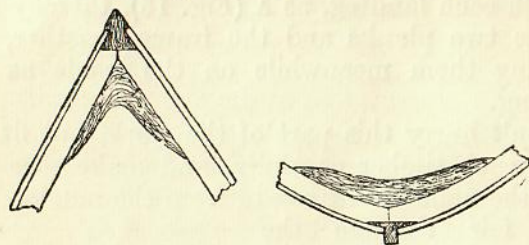


Fig. 16.

by good 4 in. galvanised nails driven hard into them from the outside through sheerstrake and gunwale. This forms a great protection to the forward and after ends of the boat, and prevents any twisting.

A belting $\frac{5}{8}$ in. half round section should be run round the lower edge of the sheerstrake outside. This, with perhaps a hollow cavetto or groove run in the sheerstrake, will add greatly to the appearance of the boat.

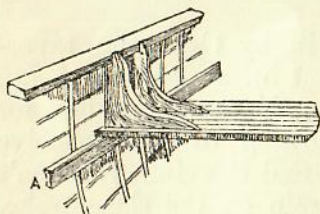


Fig. 17.

elm, and should be screwed to the frames with $1\frac{1}{4}$ in. screws, about 8 in. down from the top of the sheerstrake at midship to 12 in. forward and aft.

If you turn back to the arrangement plan

SAILING SKIFF

(Fig. 1) you will see that there are two cross thwarts 8 in. broad, and one round stern seat 9 in. broad at the side and 12 in. at the back. These should be made out of mahogany or teak. You will have to check them out in way of frames.

A fore and after will require to be fitted up forward to take the mast (see Fig. 1).

This can be portable, resting on the stringers forward, and held down to the first thwart by a couple of bolts and thumbscrews. At 13 in. from the fore side of the stem a $2\frac{1}{2}$ in. hole should be cut to take the mast, as A (Fig. 18), and directly below this on the top of the knee, a step should be fitted, as B (Fig. 18), to take the heel.

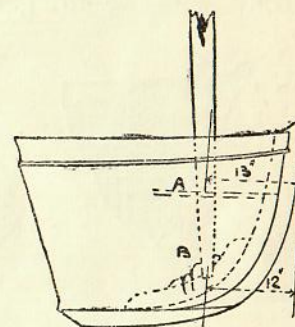


Fig. 18.

The distance to the centre of this step is 12 in., which gives a nice rake to the mast. This is a point which should always be studied in a boat with a straight keel, especially a skiff, and is characteristic of all lugger-rigged fishing-craft of this type. I have seen a yacht built from the lines of a Tarbert Loch Fyne fishing-boat, but fitted with a plumb mast, cutter rigged, and carrying a lead keel, meet the original boat in a private match, with the result that the fishing-boat, to use a nautical phrase, could leave her hull down after a few hours' sailing. These boats, being different from the deep-keeled yachts, always

CANOES, DINGHIES, AND PUNTS

stay and beat to windward better when fitted with the raking mast.

Coming back to the construction of our boat again. The thwarts are held in position by knees, two to each (see Fig. 1), and should be cut, if possible, out of natural bends of larch-wood. They will require to be checked out at the top in way of the gunwale (see Fig. 17). The two forward knees should be set at an angle to the thwart, as shown at Fig. 1. You will require to fasten them firmly with $3\frac{1}{2}$ in. galvanised nails through the

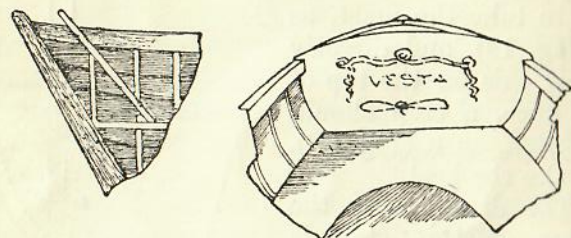


Fig. 19.

gunwales, and clinched inside. In way of the lower piece of the knee and thwart you should use 2 in. copper nails, well punched in and clinched.

The stern backboard will next require your attention. This should be of a nicely grained piece of mahogany (see Fig. 19), and if you can do a bit of carving on it, it will greatly enhance the appearance of the boat. Even the name with a rope worked round it looks well.

Turn your attention to a few of the sundry items, which, though simple in themselves, nevertheless, if well done, tend to help the appearance.

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The floor-boards (Fig. 20) are simply pieces of pine, $\frac{1}{4}$ in. thick, cut to shape and screwed down to the timbers. These should not run right fore and aft, but should be stopped about 4 ft. from the stern and 2 ft. from the stem. In this way you will be able to fit a stern sheet aft (A, Fig.

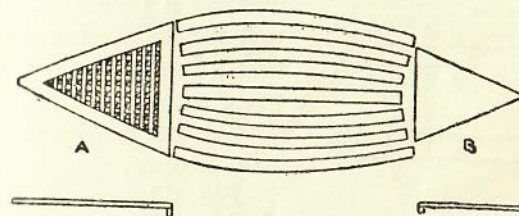


Fig. 20.

20) and a platform forward (B, Fig. 20). These two platforms should be strongly made out of $\frac{3}{4}$ in. wood, as they are raised above the bottom of the boat at the centre line, and therefore have to bear all your weight when standing.

If you care about sacrificing a little extra work for appearance, you can make the stern sheet an

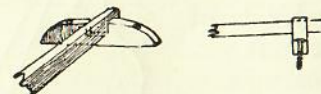


Fig. 21.

elm grating of about 1 in. mesh, which, if fitted with a teak frame or margin, looks very well.

Foot spars should be fitted in way of the thwarts, for you will be using your boat for rowing. They are $1\frac{1}{4}$ in. square in section, and strongly fitted, being portable, of course (see Fig. 21).

CANOES, DINGHIES, AND PUNTS

Next see to the fitting of the rowlocks. You will be able to buy these at any ship chandler's (A, Fig. 22). Keep them about 9 in. aft of the thwarts, and be sure to fit a stiffening piece below each rowlock to take the heel, as B (Fig. 22). You will notice that the gunwale plates are sunk flush with the gunwale, and should be fastened with $\frac{5}{8}$ in. screws.

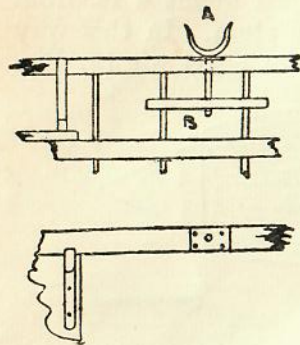


Fig. 22.

Fig. 23 shows a sketch of the rudder and tiller, which should be made out of teak. The head is in three pieces, clinched together as shown. The pintles and eyes for hanging can be got at the same place as you bought the rowlocks, and must be galvanised to stand the salt water. Here, again, on the tiller you have room to display your artistic taste, and if you can work a Turk's head in cord on the end it will add to the appearance.

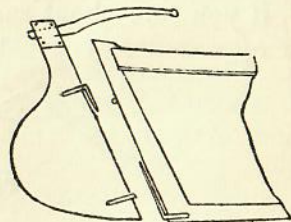


Fig. 23.

The question of spars is our next consideration, and of these there are three. Taking the mast first, this should be 11 ft. long $\times$ $2\frac{1}{2}$ in. diameter at the hasp, $1\frac{1}{2}$ in. diameter at the heel, and 1 in. diameter at the head. First take a piece of straight-grained spruce, $2\frac{1}{2}$ in. square section,

SAILING SKIFF

and mark off the centre or heart at each end. Next mark off the thickness of the spar by describing circles $1\frac{1}{2}$ in. and 1 in. respectively, these being the finished diameters at top and bottom. Measure up 1 ft. $1\frac{1}{2}$ in. from the thick end, and draw a line round it, as shown at A (Fig. 24). This is where the spar passes through the portable fore and after, or hasp, and is the exact $2\frac{1}{2}$ in. thick. Next plane off the corners of the spar, making it octagonal in section (B, Fig. 24), and in this form it is shaped to the required thickness.

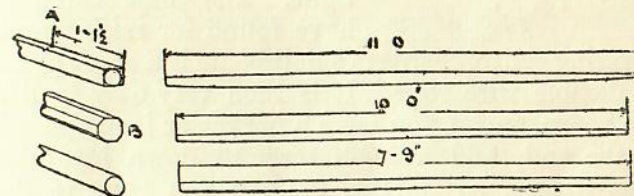


Fig. 24.

When this has been done, take a small hand-plane and round the corners. This will have the effect of making it nearly a complete circle, when, with a spokeshave, it can be gone over and afterwards rubbed up with sandpaper. The sheave to take the halliard at the masthead should then be fitted.

The other spars are done in exactly the same manner, and when finished should receive two coats of good varnish.

The boat should now be taken off the building slab and the centreboard made and fitted. First make a wooden shape or template the exact size of the board. The aft end should be a segment of a circle, and care should be taken to see that

it is going to raise and lower properly. This shape can then be taken to any ironworker, who will cut it out for you from a $\frac{3}{16}$ in. plate, when it should

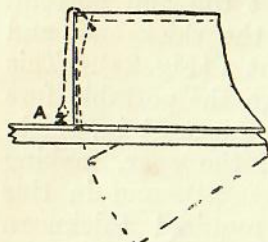


Fig. 25.

be galvanised, or, failing that, painted with red lead. The forward end is hung on a $\frac{1}{4}$ in. brass pin driven through the keel, this having the effect of keeping it outside of the case and therefore perfectly watertight. The best thing I have found for raising and lowering centreboards in small boats is a short piece of flexible wire rope. It is then very easy to lift the board, and if you have a becket or loop spliced in the end, and a hook screwed down into the breast-piece, as A (Fig. 25), all you have to do is simply to make fast here when it is hove up.

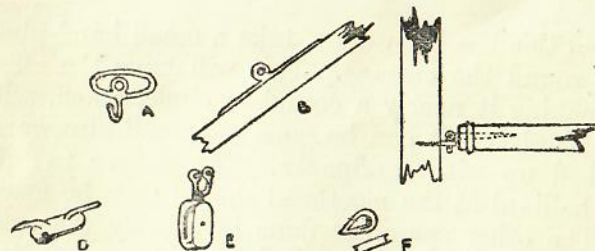


Fig. 26.

Having now got the hull of the boat practically finished, you can get ahead with the rigging. I have shown sketches of all the fittings which you will require, and these can be bought cheap at any ship chandler's. First, A (Fig. 26)

is the mast traveller, and should be 3 in. clear inside in order that it may run up and down the mast easily; B is the lug-sail sling, which is screwed and lashed to the yard to take the shackle of the halliard; C is the boom connection; D is a mainsheet cleat, a couple of which you will require; E is a 2 in. single block with shackle to make fast to the foot of the lug, and take the mainsheet rope, and also some small thimbles, as shown at F. This, with a few fathom of $1\frac{1}{2}$ in. rope—rope is measured by circumference—will complete the outfit.

As regards the sail, I should strongly advise you to get it made by a sailmaker for all it will cost, as it is a difficult job for an amateur to take in hand. The sculls, which are 9 ft. long, should also be bought, unless you are an extra good hand with working the tools.

I think your little craft is now ready for the finishing touches, and you will require to caulk the keel and stem and stern posts with cotton-wick driven into the seams with a caulking-chisel; but if you don't possess such a thing, then an ordinary blunt wood-chisel will answer the purpose all right. Care should be taken not to force too much cotton into her, as it will swell very much when she gets into the water. As for the planking, you can go over it here and there with a holding-on hammer and tighten it up where necessary, but I don't think you need be afraid of this. She will certainly let in a little water to start with—"all boats do"—but will take up quickly.

You should give her two coats of good var-

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nish inside, and as for the outside, that depends pretty much on your own taste. My own opinion is that for a small boat like this, providing the workmanship is good, nothing looks better than varnished top-sides with a white under-body. Should you want to fit air-cases, then the space at each side of the centreboard under the midship thwart should be utilised. Any tinsmith will make you a couple of airtight boxes out of galvanised iron or zinc, say, about 12 in. long $\times$ 12 in. deep $\times$ 6 in. broad. This will be found quite sufficient.

And now your little craft is ready for sea, and I am certain that, should you have followed the instructions given, you will be the proud possessor of as handy and reliable a boat of her size as it is possible to get. She will reach, run, or beat to windward, and for day sailing and fishing has many advantages over the decked boat; and no matter where you intend using her, or what company you may find yourself in, she can at all times be relied upon, through fair weather and foul, to give a good account of herself.

HOW TO MAKE A FISHING PUNT

By GORDON MEGGY

Ask the ordinary boat-builder how much he will charge to build you a fishing punt and he will probably surprise you with the extent of his demands. To remonstrate with him is useless. He enlarges upon the expense of material, the skill and knowledge required and the time occupied, and you will no doubt come to the conclusion that the craft is beyond your pocket.

Yet the building of a fishing punt is no difficult matter to anyone with a taste for amateur carpentering, and the cost will not exceed a few pounds, which will cover every possible item for a good punt 14 ft. long.

Given a shed large enough for the purpose—it is best to do all the work under cover, although the writer has personally built a punt out of doors—and a few carpentering tools, the first thing to secure is the wood. Now you will want:

A.—Eight 14-ft. lengths of inch matchboard $5\frac{1}{4}$ in. wide.

B.—Two 14 ft. planks 11 in. $\times$ $\frac{5}{8}$ in.

C.—One 10 ft. plank 11 in. $\times$ $\frac{5}{8}$ in.

D.—One 4 ft. plank 1 in. $\times$ 7 in.

E.—Two 12 ft. lengths 4 in. $\times$ 1 in.

F.—Two 12 ft. lengths $\frac{5}{8}$ in. $\times$ $\frac{7}{8}$ in.

G.—One 18 ft. length 2 in. $\times$ $\frac{7}{8}$ in.

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"A" will be already planed, and you may be able to get "B" with one side planed, which is all the better. You will have to get the rough sides of "B" planed up, as it will probably be too long for you to handle, and the cost will be very little. If you purchase the wood at a big timber-yard everything can be planed up by machinery at a small cost, and you will be saved much labour. "B" should be carefully selected planks, sound, and with *no knots on the edges*, for these two are for the sides of the punt.

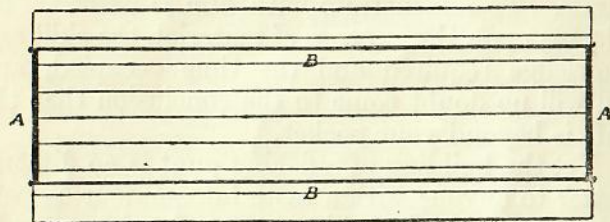


Fig. 1.

Having got your wood, the first thing is to lay down the bottom of the punt. Place the eight lengths of inch matchboarding upon a flat floor, levelling the ends carefully and fitting the tongues in, but do not press the boards up tight, as room must be left for the wood to swell when the punt is in the water. From "C" cut two pieces 2 ft. 6 in. long, squaring the ends carefully. From "E" cut a piece exactly the breadth of your eight floor-boards as they lie. Now then, place the two planks "B" side by side on edge upon the floor-boards and get someone to hold them parallel and 2 ft. 4 $\frac{3}{4}$ in. apart, while you roughly nail on

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to each end the two pieces that you have just cut from "C" (Fig. 1).

Now wedge the piece of "E" you have cut between the sides in the centre so as to press them away from each other. Your boat is now roughly formed (Fig. 2).

The reason for bulging the sides out at this point is to enable you to trace on the floor-boards the curve of the sides, which can now be done by running your pencil over the bottom boards round the *inside* of the sides. You can now take the

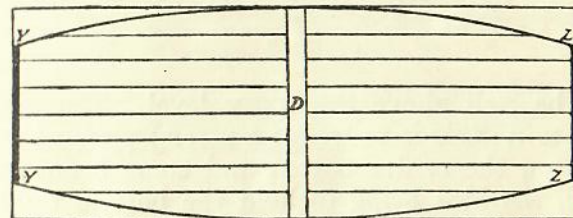


Fig. 2.

sides down again and carefully saw the curve you have marked on the bottom boards. Once this is done the bottom is ready to be put together, but before doing this it is as well to paint the tongues of the boards with any old thick paint you can get hold of, or with tar mixed with a little pitch.

Having put the floor-boards together, remembering not to press them up too tightly, screw on the centre batten which you have already cut from "E." Two screws for each match-board and the screws to be on alternate sides of the batten. In Fig. 3 the position of screws,

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which should be $1\frac{3}{4}$ in. long, is indicated, as also is the position for the other battens.

The bottom is now complete, and the next thing is to bend it up so that the ends of the punt

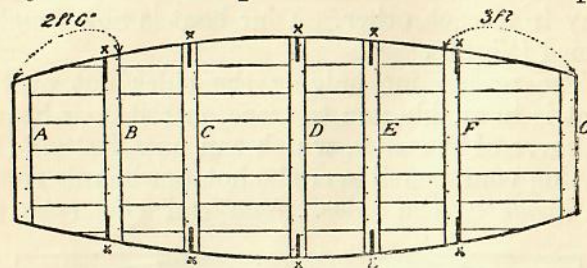


Fig. 3.

will be well above the water level. The easiest way to do this is to wedge a strong piece of wood between the centre batten and some beam overhead, the idea being to hold the bottom tight to the ground at the centre. The alternative is to put a lot of heavy weights—bricks, iron, or any

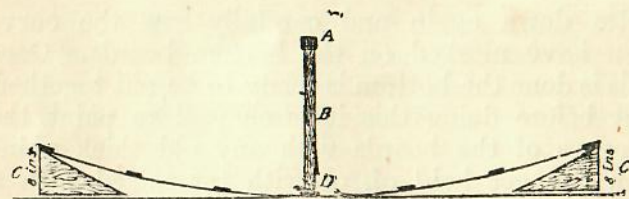


Fig. 4.

thing—on the centre batten, but they must weigh very heavy. The ends can now be bent up by knocking wedges under them. You should first cut four wedges out of any old piece of board, as in Fig. 4. Insert one wedge at each corner

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and knock it in until it is right home. The ends will then be raised 9 in. from the ground while the centre is *still tight to the floor*. If raising the ends has raised the centre you must weight it down till it touches the ground.

The sides can now be placed on the ground against the bent flooring (the outside edge of which should be smeared with tar or old paint) and screwed into position with $1\frac{1}{4}$ in. screws at intervals of 6 in. The screw-holes must be made cleanly with the bit and brace to avoid splitting, and the heads countersunk. The overlapping edges of the sides, under the bottom, can be sawn and planed off afterwards (Fig. 5). It will be



Fig. 5.

easy to mark the screw-holes by measuring to the bottom inside and then allowing half an inch more on the outside.

To keep the sides in position get ten japanned iron brackets 10 in. $\times$ 8 in. One of these is screwed on at the end of each batten, except the end ones. When you come to battens "B" and "F" you must cut the point of the brackets and make new screw-holes—or else get smaller brackets to fit. The boat will now be held rigid.

The ends are next fitted. A strip of wood 2 in. $\times$ 2 ft. $4\frac{3}{4}$ in. is screwed between the ends and over the outside of each of these end-pieces is daubed more tar. Then a strip of 3 in. $\times$ 2 ft. $7\frac{1}{4}$ in. is screwed on over all, making a double

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end. Rough edges can be trimmed off with the plane before this goes on, so that it sits comfortably. These end-pieces can be cut from those used (A, A, Fig. 1) to join the ends at first.

Additional strength is added by the seat which is fixed over the centre batten. The plank "D" is cut to fit exactly, and is screwed down to 7-in. fillets, cut from "G," which are screwed on to the sides, for the seat to rest on. The seat should be about 1 in. below the top of the sides,

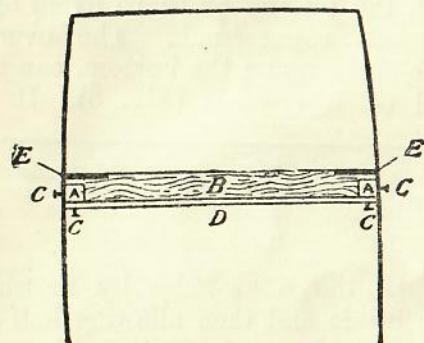


Fig. 6.

and it will be necessary to cut a channel in the fillets, so that they fit over the top of the brackets.

It now remains to make lockers at each end. The fronts of these are cut from "C" and screwed at the bottom on to the front edges of battens "B" and "F" (Fig. 3), the edges are screwed into from outside the sides of the punt, and additional strength may be given by dropping a fillet cut from "F" into the inside corners. This fillet is screwed on to from the outside of the locker-fronts, and the outside of the sides of the punt (Fig. 6).

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For the locker-tops you will want some $\frac{5}{8}$ in. matchboard. This varies in width according to whom you go to for it, but the width will not matter if you fit it crosswise. Fig. 7 will explain how to cut the locker-tops. On the underside the locker-tops will be held together with three battens, 2 in. shorter than the locker-top, so as to clear the back and front. These battens can be cut

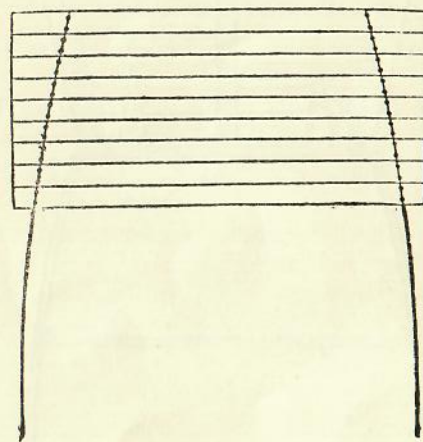


Fig. 7.

from "F" and "G" (Fig. 3). The two outside battens should be fixed as near the edge as possible, but allowing them to clear the sides easily. The lids are hinged to the ends as shown on Fig. 8.

The strut which holds the boat down should not be removed till all the brackets are fixed and the ends and locker-fronts are on, but at any time after this you can turn the boat over and trim off the overlapping sides. Once the locker-tops

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are on, the punt is ready for pitching and painting.

The pitching is an easy matter provided you do not mix too much tar with it, in which case it will not set. Four pounds of pitch boiled up with a pint of tar will be enough to coat the whole of

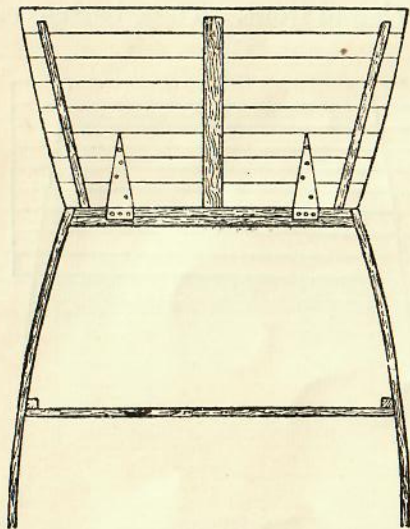


Fig. 8.

the bottom. It must be brushed on boiling hot, so as to go well into all the seams, and it is well to run over all these parts with a very hot flat-iron, so as to iron the pitch into the cracks. Touch up with pitch after the ironing, giving a complete second coat. An easier and cleaner job can be made by using what boatbuilders call "black varnish" instead of pitch. This dries hard and

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smooth, and can be put on as easily as paint, but before doing so the cracks between the matchboards should be carefully stopped with red lead. In a day or two at most the bottom should be set hard, and the boat can be turned right side up for painting. It will want two coats. It is of the utmost importance that each coat should be allowed to dry thoroughly, and two whole days is not too much for this. Before giving the second coat of paint rub all the grain down with sandpaper, and fill up all screw-holes, etc., with red lead, sandpapering neatly level, after allowing 24 hours for the stopping to harden. A coat of varnish over all will improve the appearance, and when this is quite dry and hard the boat is ready for launching.

Pitching the inside floor of the punt is not necessary. If it is well painted it preserves the wood just as well and is not so messy, or it can be treated with black varnish.

A false bottom can be made out of $\frac{1}{2}$ in. boards fastened together in sections to fit on the battens between the brackets. In each section finger-holes should be cut with a brace and bit, so that the floor-boards can be lifted up easily when any rain-water has to be mopped up.

Notes for Illustrations

Such a punt will be light, serviceable, and strong. If you have left plenty of room between the floor boards for swelling there will be no strain on any part of it; but if you wish to be quite sure of making a thoroughly good job of it, get your

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ironmonger to cut you from a strip of 2 in. hoop-iron four corner-pieces each with two screw-holes in it. These can be screwed on at each corner as in Fig. 9.

The faint lines indicate the floor-boards. The two end pieces A A are roughly nailed on to the sides B B.

The batten D, cut from E, is wedged between the sides at the centre, so that they are pressed outwards to the fullest extent of the floor-boards,

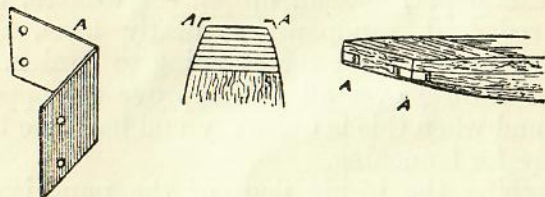


Fig. 9.

upon which the curve can be traced with a pencil run along inside from y to z.

Diagram showing position of all the battens and method of screwing and also position of the brackets x. Note that the brackets on battens B and F are screwed on to the edge and not centre of battens.

Sectional view of bottom, showing strut B wedged between beam A and centre batten D. The wedges c c are cut in 8 in. high, so that when driven home as shown, the top level of floor-ends are 9 in. from the ground.

Side view of punt. The dotted line indicates overlapping portion of side, which must eventually be sawn and planed off flush with the bottom.

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The locker front D is placed against batten B, fillets A A being dropped into the inside corners and screwed into through the locker-front and the sides of the punt, c c. E E are the brackets, and the reason is now seen for fastening them at the outside of the batten, so as to leave room to handle the fillets more easily.

Having cut enough lengths of the $\frac{5}{8}$ in. match-board to cover the locker, fit them together, place them on the locker, and run the pencil round underneath. The curve of the outside of the locker-sides will then be marked upon the underside of the locker-tops, each board of which can then be cut. Saw well outside the pencil line, and plane down flush with sides when finished and fitted.

Inside view of locker-top, showing the kind of hinge to be employed and position of battens. For the latter, strips of "F" can be used for the outside, and of "G" for the centre.

Hoop-iron corner-pieces screwed on at each corner, A A, lend additional strength.

HOW TO MAKE A SAILING PUNT

By H. F. HOBDEN

A PUNT, or flat-bottomed boat, is so easily constructed that anyone with but the slightest knowledge of boat-building can fashion one, and for that reason it is the form usually selected by amateurs in their first attempt at making anything to float; but, even in building these simple craft, some definite lines are required to work to, or the result will be more like a coffin or badly made egg-box than a boat.

Now, there is no reason why a punt should not be a smart-looking craft, and if you carefully follow these directions you may easily turn one out capable of good speed and of holding her own in appearance amongst craft of her size.

Having only one sail, she is easily handled, and from her light draught and rounded floor can be taken into shallow water, up narrow creeks, or pushed over mud banks, where any ordinary-shaped boat could not go. Then, owing to her flat bottom, there is plenty of room for living and sleeping on board for yourself and a chum, and, with a properly fitted canvas tent or cover, which I will describe later on, you will be very snug and comfortable on board. To get this amount of accommodation she should be 16 ft. long, and, with 5 ft. 6 in. beam, she will stand a

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breeze well, and the centre-board holds her very close to the wind.

I suppose you all know that a centre-board, or drop-keel of some kind, is a necessity with all shallow-draught sailing-boats, and that without a deep keel they sag away to leeward like a paper bag, so it is scarcely necessary to remind you that without it she would be no good at sailing except when running before the wind; but I mention it here in case some might think they could do away with it and the extra trouble involved in building at the same time.

When starting, if you have no shed to build her in and are obliged to work in the open, take care to cover her each night with a tarpaulin, and then, when ready to paint, the wood will be in a fit state to take it.

On looking at Fig. 1, which is the "sheer plan" or side elevation, you will see that the bottom, although flat in cross-section, has considerable sheer fore and aft. This enables her to turn quickly when "going about," as on a pivot, and her nose being well up above the water makes her a good sea boat and dry.

The line marked *w l* is the load water-line, and from this all measurements should be taken for position of sections when setting them up to build on.

Three feet of the stern is decked in and forms a large locker, useful for stowing food, etc., in, and the same length being covered in forward makes a convenient place to stow spare gear, ropes, etc., in, and so helps to keep the boat tidy when living aboard.

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These decked portions are also shown clearly at A B in Fig. 1 and in deck plan, Fig. 2. The after-

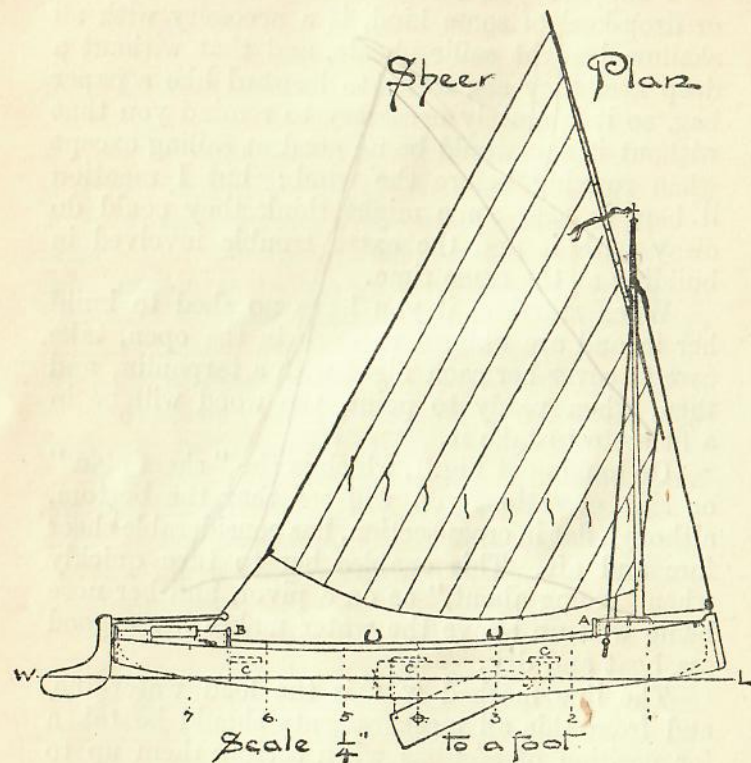


Fig. 1.

locker has an opening on top fitted with a raised coaming or edge and a lid to fit.

A narrow waterway or deck, 3 in. wide, is fixed on each side between the decked portions, and

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to this is screwed a coaming 2 in. high. This helps to stiffen the boat considerably and also gives extra side or freeboard and makes her nice and snug.

The body plan is shown at Fig. 3, and note the position of water-line, W L, on each section, as it is most important. One side gives the forward sections, and the after sections and transom are on the other side of central line. Each of these is

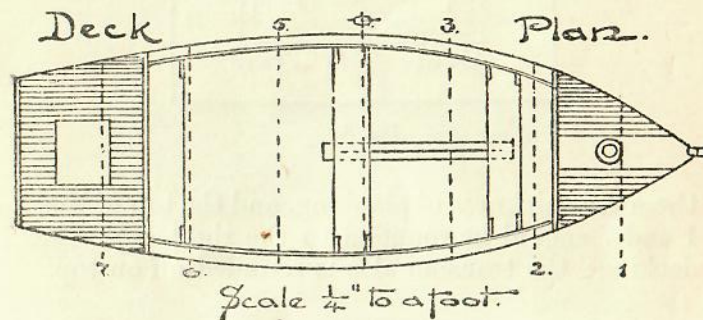


Fig. 2.

numbered, and the corresponding number marked on the vertical lines in sheer plan gives the correct position for placing them.

These three drawings are to a $\frac{1}{4}$ -in. scale, and the first thing to do is to enlarge the sections on paper to full size, and then make rough wood frames, or shadows, as in Fig. 4. They can be made of any odd pieces nailed together, no matter how roughly so long as the outside shape is correct. A couple of ties, A B, are necessary to keep them square, and a central nick is cut at c as a guide.

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The corners, D, are also cut out to allow room for the stringers to be placed in without removing the sections.

Half an inch must be allowed off either side of

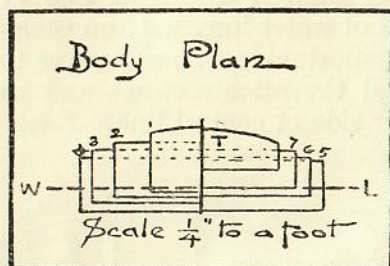


Fig. 3.

these for thickness of planking, and the top of Nos. 1 and 7 should be rounded to the right curve for decking; the transom also is rounded off on top.

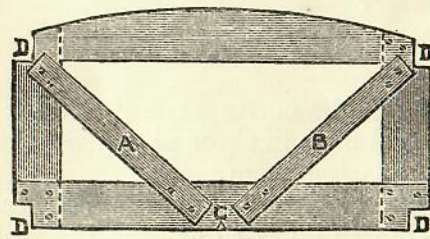


Fig. 4.

For the sides you will require two planks 15 ft. long by 10 in. wide, and $\frac{1}{2}$ in. thick when planed, and two others, of same thickness, 17 ft. long by 12 in. wide.

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One plank 22 in. wide for each side would be better and save trouble in fitting, but although that width might be procured in mahogany it would be very expensive, and the chance of flaws and shakes is, moreover, greatly increased in wide planks, so we will use two on each side, as 10-in. and 12-in. planks can be obtained at any timber-yard. You will find the best yellow pine very suitable for the purpose. It must be quite free from knots, as they are apt to come out when the wood is bent.

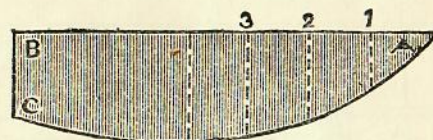


Fig. 5.

On the kitchen floor, or any other smooth, flat surface, draw out lightly in pencil one half of the deck plan to the full size and mark the position of each section as in Fig. 5—A B is the centre line, B C half the transom, and C A the deck line. The sections 1, 2, 3, etc., are spaced two feet apart.

Now take a thin batten and bend it round the curve A C, mark where each section line cuts it, and number them.

One edge of each side plank must now be planed true and straight the whole length, so that when a 10-in. and 12-in. plank are laid edge to edge it is a close fit. Have the 10-in. plank for the lower one, and mark the water-line, W L (Fig. 1),

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in pencil, and on this lay the batten flat and mark off the position of each section line, thus allowing for the curve of the sides.

Draw vertical lines, A A (Fig. 6), right across both planks at each section mark, and on these sectional lines, measuring from the water-line, mark off the amount of sheer both above and below; now draw a line through those points, and you will get the shape of the side, which can then be sawn out.

These can then be laid on the other two planks, marked round, and sawn out as before.

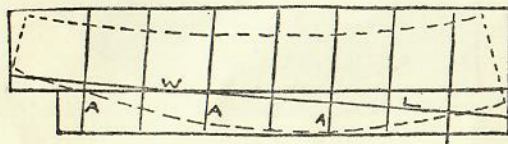


Fig. 6.

The edges which come together should have a coat of red and white lead, thinned with oil and turps, painted on, and some narrow tape, dressed with the same mixture, is laid between the planks, which must now be tightly wedged together.

To do this, lay them flat on the ground as in Fig. 7, and drive in several stout stakes, A B C, against the top edge of plank, and then others, D E F, about 2 in. below the bottom plank; against these lay any odd piece of timber G, and tighten up the planks by driving in the wedges K K.

Now fasten them together by screwing on the timbers H H; have them $1\frac{1}{4}$ in. wide by 1 in. thick; space them 1 ft. apart, placing them just aft of

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the lines marked for sections—they should be $1\frac{1}{2}$ in. from top edge of upper plank—and leave a space of $2\frac{1}{8}$ in. below them to lower edge of bottom

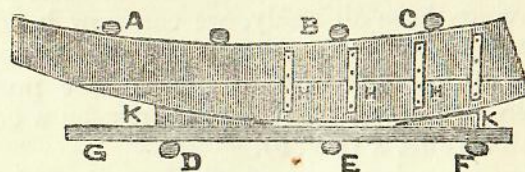


Fig. 7.

plank, as shown, to allow room for the stringers, and their vertical edges may be chamfered or rounded off as a finish.

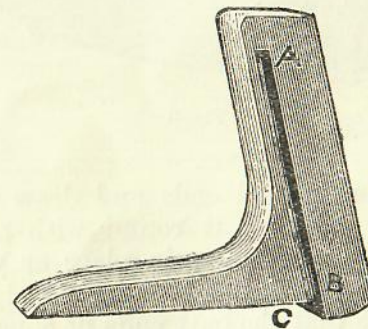


Fig. 8.

The other side is now put together in the same way, but take care to place the timbers so that they will be inside when the boat is bent up to shape.

The transom, T (Fig. 3), has now to be cut to fit. It should be of 1-in. oak, and the stem (Fig. 8)

CANOES, DINGHIES, AND PUNTS

of $1\frac{1}{4}$ -in. stuff—get it with a natural curve in the grain if possible; cut a rabbet, A B, on each side to take the end of side planks, and also cut it back 1 in. deep at c to fit against the keel plank.

Having these all ready, we can now bend the sides up to shape. Place the midship section marked ⊕ in deck plan in its correct position between them, and fix it temporarily by a couple of small screws, A (Fig. 9).

Then tie a loop in a piece of stout cord, pass

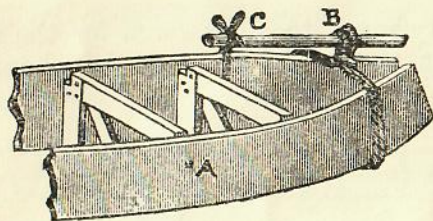


Fig. 9.

it round the forward ends and draw the planks together by twisting it round with a stick, B; put the forward sections in place as you tighten up the sides, and finally put the oak stem in position, and see that the butt ends fit snugly into the rabbet cut out for them. When quite tight up, secure the end of stick, B, with a lashing at c, to prevent the cord untwisting while you get the after-sections and the transom in place; tighten up with another cord and make fast.

Having seen that they are quite level and true, fasten the sides to the transom with $1\frac{1}{2}$ in. copper boat nails or brass screws—a hole for each must

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first be drilled to the full depth of the nail, or you will either screw off the heads or double up the nails in trying to drive them into oak.

Then fasten in the stem head in the same way, and the cords can be removed, leaving all clear to fix on the inside stringers, A (Fig. 10), 1 in. by $1\frac{1}{2}$ in. at top of gunwale, and a similar sized one at B, leaving a space of $\frac{5}{8}$ in. at E to allow for the thickness of bottom planking. D is the section of boat's side and c one of the timbers previously screwed on to hold the planking together. Short strips, F, may be nailed over the seam inside the planks to prevent any leakage there, and the gunwale is finished off outside with a narrow stringer, H, 1 in. by $\frac{1}{2}$ in. of oak or elm.

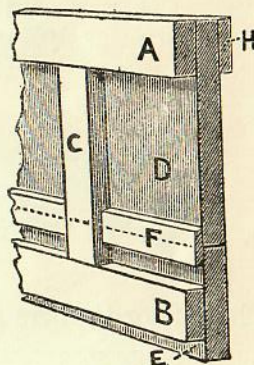


Fig. 10.

The sides are further secured to the transoms by a couple of oak knees, A (Fig. 11), 1 in. thick and fastened on with long copper nails, the ends being riveted over copper grooves inside, and the stem head is strengthened by a stout oak breast-hook, B, put in level with the gunwale.

The transom should also have a vertical knee fitted to the central keel plank, as shown by dotted lines in sheer plan, but it cannot be fixed until that is in place.

The floor timbers can now be put in. They are 1 in. thick by 3 in. wide, and are fitted close

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up under each side timber, as at A (Fig. 12), to which they are secured by oak knees, B, $\frac{3}{4}$ in. thick.

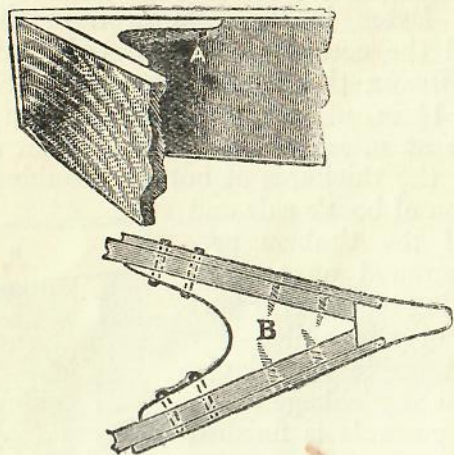


Fig. 11.

These floor timbers must follow the curve of lower

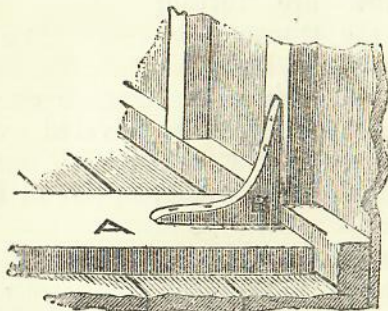


Fig. 12.

edge of side plank, so that the bottom boards will lie flush against them all when screwed down,

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and, when all the knees are in, you can turn her over and put on the bottom boards.

You will require six planks 9 in. wide by $\frac{5}{8}$ in. thick and one plank 12 in. wide by 1 in. thick—this is for the central one, and the extra thickness is necessary to carry the centre-board case.

Cut the corners off one end of centre plank to fit within the side planks at stem, and secure it to the oak knees by copper nails riveted through inside, as at A B (Fig. 13). See that it is a close fit into shoulder C, and, when firmly fixed, force

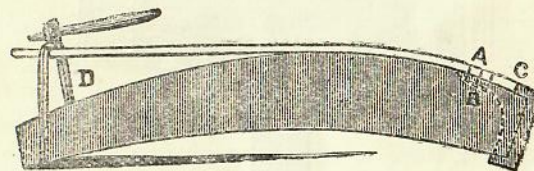


Fig. 13.

the other end down at D by a rope and stick as before, and then screw firmly to each floor timber and to the transom, against which it should be cut off flush and planed smooth.

The rest of the bottom boards are put on in the same manner. Paint the edges with the red-lead mixture and insert a strip of tape, also coated with the same, and, if carefully fitted, no further caulking will be needed in the seams. The lower stringer forms a bearing for the outer plank, to which it is screwed, and the seam between that and the side is caulked lightly with lamp cotton dipped in "black varnish," after which the whole of the bottom should have two coats of the same.

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It used to be a cheap mixture, but although the price has gone up it is about the best thing you can try for keeping out damp. As you cannot paint over it, don't put any on the top sides.

Now turn her right-side up again, take out all the sections, and fit the centre-board case (Fig. 14).

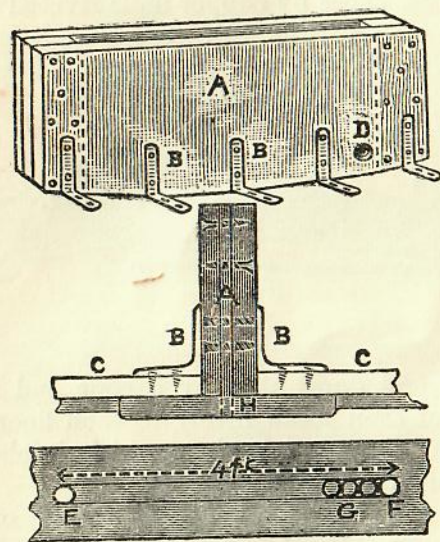


Fig. 14.

Two boards, 4 ft. 6 in. long by 1 ft. wide and $\frac{3}{4}$ in. thick, are laid together, with a strip 3 in. wide by $\frac{1}{2}$ in. thick between them at either end, to which they are firmly screwed, as in end view at A. The inner side of the boards is first given

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two or three coats of black varnish, and, when all are screwed together, the lower edge is sawn to the exact curve of keel plank, through which a slot 4 ft. long by $\frac{1}{2}$ in. wide must be cut, as marked in the deck plan (Fig. 2).

Draw the position of slot with a pencil, and then drill a hole right through at either end with a $\frac{1}{2}$ -in. centre-bit, as at E F; then bore two or three more at G, and the holes may then be squared up with a chisel, giving sufficient space to get a saw in, after which you can rip along each line until reaching E.

A $\frac{1}{2}$ -in. hole is now drilled through both sides at D, and the centre-board, which should be of galvanised iron $\frac{1}{4}$ in. thick and sloped as shown by dotted line in Fig. 1, has a corresponding hole drilled in it, and is hung on a $\frac{1}{2}$ -in. bolt placed through all, any leakage being prevented by a rubber washer placed under the head and nut.

The floor timbers, C C, that cross the slot must be sawn back $\frac{3}{4}$ in. each side of slot to allow the case to come flush down on keel plank, H.

A strip of tape well coated with black varnish is laid round the slot, and, the case being placed on it, is secured there by five iron knees on either side, B B, screwed to the floor timbers.

The case is first screwed down very firmly against the keel plank by a couple of temporary clamping screws, made from $\frac{1}{4}$ -in. iron rod, about 15 in. long, fitted with thread and nut at A (Fig. 15), and head at B; two pieces of hard wood, C D, are placed between to prevent injuring the boat, and when all the knees are fixed you can remove the clamps.

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There is always a great strain on the centre-board case when sailing in a strong wind, so you cannot take too much care in fitting it properly to begin with, as it will save you a lot of trouble afterwards.

The finishing piece, A, and backboard, B (Fig. 1), have now to be put in, and the carlines, as shown by dotted lines, fitted for carrying the decks. Four are required aft, $1\frac{1}{2}$ in. deep by $1\frac{1}{4}$ in. wide; one is nailed to the transom and another to the backboard, B; the others carry the hatchway, which is 18 in. by 15 in., and should be fitted with a raised coaming and a lid to keep out the rain, as shown in section at Fig. 16.

A good padlock at A is a very useful addition, but do not fit any hinges; a couple of irons bent as at B are far better in a boat, and never set fast through neglect.

The decking forward requires three carlines, one being nailed to framing piece, A (Fig. 1); lay the deck in narrow strips, $\frac{3}{4}$ in. thick by 2 in. wide, with a centre plank, 1 in. thick and 9 in. wide, in which a hole for the mast is cut, as in Fig. 2, and a ring of hard wood or brass plate screwed on gives a finish to this.

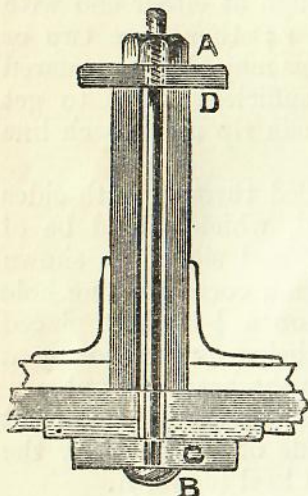


Fig. 15.

A good padlock at A is a very useful addition, but do not fit any hinges; a

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Cut a step for the mast, c (Fig. 16), and screw in place directly below the mast hole before fixing the deck.

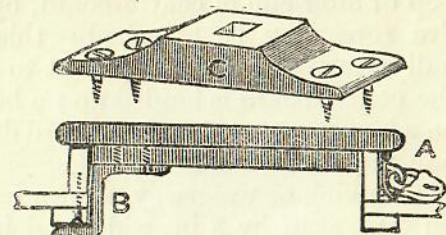


Fig. 16.

The thwart, c c c (Fig. 1), are next put in; they should be 1 in. thick by 9 in. wide; the

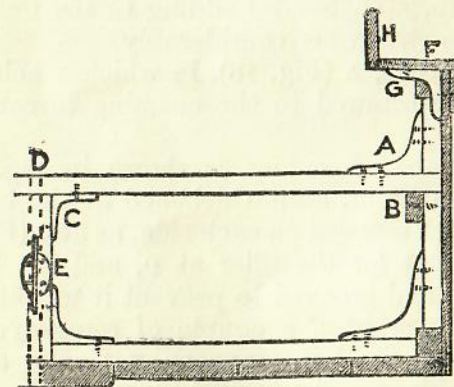


Fig. 17.

ends rest on stringers nailed to the side timbers, as at B (Fig. 17), and the two forward thwarts are supported in the middle by the centre-board case, to which they are fastened by a couple of

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iron knees, c, and are also fixed to the sides by the oak knees A. Nail on a strip of $\frac{1}{2}$ -in. stuff to cover the slot on top of case, and drill a hole near the top of after-end of centre-board, by which a steel-wire rope may be attached; this is led over a small sheave at D and made fast to a cleat, E, when the centre-board is hauled up; a becket or loop on the wire prevents the centre-board dropping farther than required when in use.

The side decking or waterway, shown in Fig. 3, is cut from $\frac{1}{2}$ -in. stuff by 3 in. wide, and is nailed down to the gunwale, as at F in Fig. 17, and is strengthened by the knees G underneath.

Against the inner edge of this a coaming, H, $2\frac{1}{2}$ in. deep, is screwed; this gives a great finish to the ship, and, besides adding to the freeboard, it helps to stiffen her considerably.

Oak chocks, A (Fig. 18), in which a hole, B, is drilled, are screwed to the coaming to carry the rowlocks.

The shape of rudder is shown in Fig. 1. It should be of $\frac{3}{4}$ -in. stuff thickened at the head by a $\frac{1}{2}$ -in. cheek screwed on each side, as at C (Fig. 18). A hole is cut for the tiller at D, and the bottom is tongued and grooved to prevent it warping.

It is hung from a couple of screw-eyes, two others being fixed in transom, E E, and an iron pin, F, holds it securely and prevents the rudder being unshipped should it strike the ground in shallow water. The tiller may be of iron. See that the tongue, G, fits the hole, D, tightly, and also leave a good shoulder at H to prevent it sagging down.

A strip of half-round galvanised iron, $\frac{1}{2}$ in.

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wide, screwed on round the gunwale is a good protection but not a necessity, and she can now be smoothed down with glass-paper and is ready for painting. Give her two coats of any colour you fancy; see that each is dry before putting

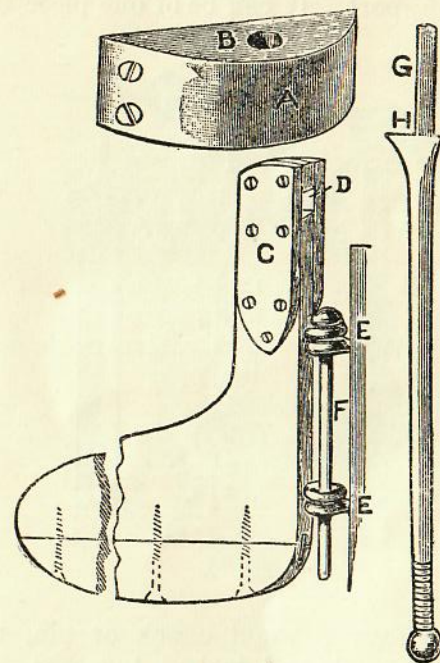


Fig. 18.

on the next, and finish off with one coat of good varnish.

Bamboo is very suitable for the mast and yard if you can get it stout enough, as it is very light and strong. The mast should, of course, be stouter than the yard, but both are 12 ft. long; the top

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of mast and the ends of yard are whipped with twine to prevent splitting, and a small wooden truck, A (Fig. 19), carries a brass rod and coloured ribbon.

A single steel-wire rope stay on either side is sufficient support. It can be of one piece doubled

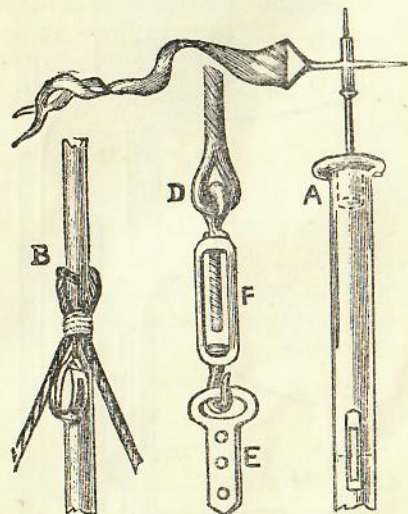


Fig. 19.

and passed over a wood chock or pin, B, fixed 18 in. from truck and lashed together, and the ends finished off with an eyelet spliced in as at D; a strap-eye, E, is screwed to each side a little aft of the mast, and a lanyard, or screw-shackle, F, will set up the rigging as tight as a drum.

A sheave is inserted at C for the halliard to reeve through; but, if you use bamboo for the mast, have a small block instead, as the bamboo

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is apt to split. I prefer a pine mast with a sheave hole, as it looks neater.

The yard is provided with a brass eyelet, A (Fig. 20), lashed to it about 3 ft. 9 in. from its lower end, and this is hooked on to the iron traveller, B, which slides on the mast, and the halliard, being

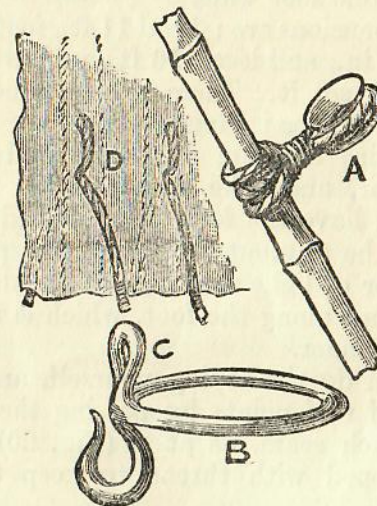


Fig. 20.

made fast to the loop C, is passed over the sheave and then down through a pulley on the stem head, and is then led aft to a cleat on the mast or to one fixed at side of centre-board case, and this arrangement is very handy when sailing alone.

Making the sail is rather a big undertaking, for it is only here and there that one finds a boy handy with a needle, and, as it is of no use thinking to rig up an old sheet or counterpane, for this

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work I should advise you to get your sister, or some other fellow's, to help you, as it should be made in strips or cloths, if you wish to get a properly fitting sail.

One cut with narrow cloths always looks best and sets flatter, and in this case do not have them more than one foot wide.

The dimensions are: head 11 ft., foot 9 ft. 8 in., luff 4 ft. 6 in., and leech 16 ft., with a total area of about 88 sq. ft. There will be nine cloths in this, and the shape is given in Fig. 1.

A full-size diagram of this should be drawn on the floor, and take care to keep the angles correct and have the foot well rounded as shown.

It may be of stout calico of good quality (unbleached) or of light canvas, and should be roped round, except along the foot, which is finished off with a wide hem.

You can do the roping yourself, and also put in a row of reef points by passing them through twice in each seam, as at D (Fig. 20), the ends being whipped with thread to keep them from untwisting.

The tack is made fast to a cleat on the mast, and a hook on the after-deck is screwed on each side to pass the mainsheet over.

And now I want to caution you against the dangerous practice of making the sheet fast when sailing in an open boat; it has led to many accidents. On a powerful decked craft it is another thing altogether, for then if a plank or two goes under water during a heavy puff it does not matter; but in open boats the sheet should always be held in the hand, and then, if an extra heavy

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squall strikes you, and she does not luff to it in time, you can ease off the sheet at once.

During some years' practical experience at sea-yachting, I have seen several accidents through the sheet becoming jammed and not being able to release it in time, and on one occasion only just reached the spot in time to get a couple of men aboard as their boat filled, and, as is too often the case, neither could swim a stroke—it was a very close shave for them.

To have a boat that you can sleep aboard not only adds considerably to one's enjoyment, but is a great saving in hotel expenses, and the entire freedom you enjoy and the healthy outdoor life will harden your muscles and do you no end of good; so just a few words as to fitting her for camping out.

This boat is especially suitable for the purpose, as there is plenty of room to sleep two comfortably, and the locker aft is large enough to hold sufficient food for the same number for at least three weeks; and a water keg, anchor and line, with some spare rope for mooring her, a pail, large oil-can, lamp, and cooking utensils, may be stowed away under the forward deck, keeping the boat clear and tidy for working.

The canvas tent is set up very easily, as shown in Fig. 21, by fastening the halliard round the end of a bamboo spar, 12 ft. long, placed underneath the canvas with the end projecting through a hole at A.

The tent is then laced to some small brass eyes, B B, screwed round the boat's side, and is then set right by hauling on the halliard from the

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inside; the inner end of spar is lashed to prevent it slipping forward. The door is at c, and a flap about a foot wide is made to overlap, and is secured at night by two or three large metal hooks and eyes sewn on inside.

A lamp to light up the tent may be hung about two feet below the point A to prevent it damaging the canvas, and as the ventilating hole is above

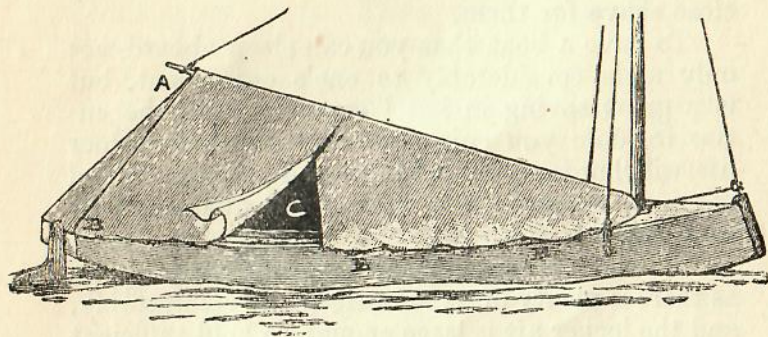


Fig. 21

it, the hot air escapes readily. The yard, with the sail furled tightly up, can take the place of the bamboo spar, but on a wet day it is better to have it outside, as it is apt to drip and make things unpleasantly moist.

You can make the tent of stout unbleached calico. Put it in water to shrink it first, and, when dry, cut it to about the shape of A (Fig. 22), which gives the dimensions, but when sewn together it should be finally fitted on the boat itself before cutting it round. This pattern gives about six feet head room at the highest point, which is

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rather important, as it is a great convenience to be able to stand up straight when dressing in the morning.

The piece B is sewn in with a double seam and forms the slant aft, and, cut off straight at top, leaves the ventilating hole at c for spar to pass through, and a small flap, or overlapping piece, can be sewn on outside to keep the rain out there.

The slit cut at D for the door should have the edges finished off with a wide hem, and then the extra flap is sewn on as in dotted line.

When it has been fitted, and the outline marked all round with a pencil, finish the edge with a wide hem to strengthen it, and insert small brass eyelets all round, about eighteen inches apart, by which it may be laced down.

Now soak it thoroughly in clean cold water again, and allow it to hang on a line for about half-an-hour, and then, while still wet, give it a coat of boiled linseed oil, outside only, lay it on with a stiff brush, and then leave it to dry; this will take, if the weather is fine, about a week or ten days.

Then give it another dressing with the oil

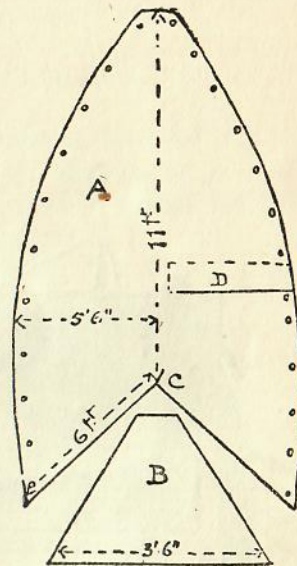
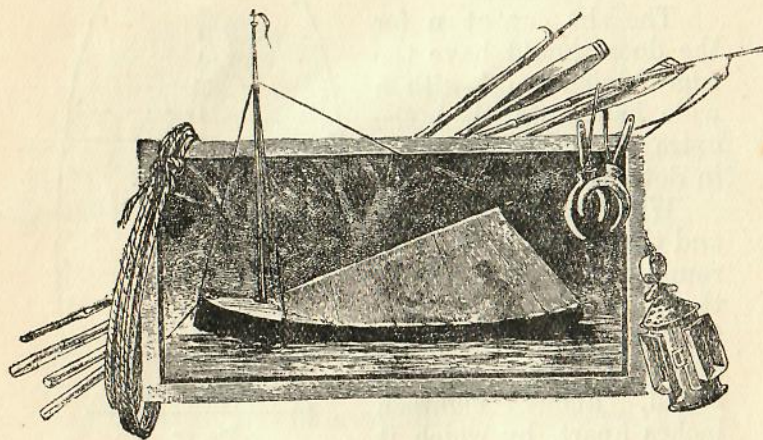


Fig. 22.

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mixed with a little burnt umber to colour it, and when that is quite dry a third coat will finish it, and you will have a watertight roof you can sleep under safely during the heaviest rain; and, having got the tent up, I wish you all many a pleasant trip, and will now turn in for the night.



A SAILING SHARPIE AND HOW TO BUILD IT

By D. F. McLACHLAN

To those who take an interest in boat-sailing, and who seek their pleasure on the water, there is no type of craft more admirably suited for their purpose than the sailing sharpie.

A boat of this type, with her heavy centre plate lowered, has enormous stability, which allows of her carrying a sail-spread that will drive her to windward like a bulb finner; and at the same time, for running with the wind or river cruising, her shallow draught with plate raised makes her an ideal craft.

From stem to stern the boat now designed for our readers measures 14 ft., with a beam of 6 ft. 6 in., and a depth of 1 ft. 9 in., which will give a draught of 8 in. with the plate up for running, and 3 ft. when the plate is lowered for beating to windward.

This centre plate which she carries is $\frac{5}{16}$ in. thick and weighs 42 lb., and does away with any inside ballast that would otherwise have to be carried.

A boat of the type which I am going to describe, having a flat floor transversely, and being built with wall sides, is an exceptionally easy boat to construct. This can be seen from the sections, Fig. 2.

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You will see we have eleven of these sections, and they are spaced 1 ft. 2 in. apart, as shown by the profile or elevation

In starting to build the boat, the first thing to do is to construct

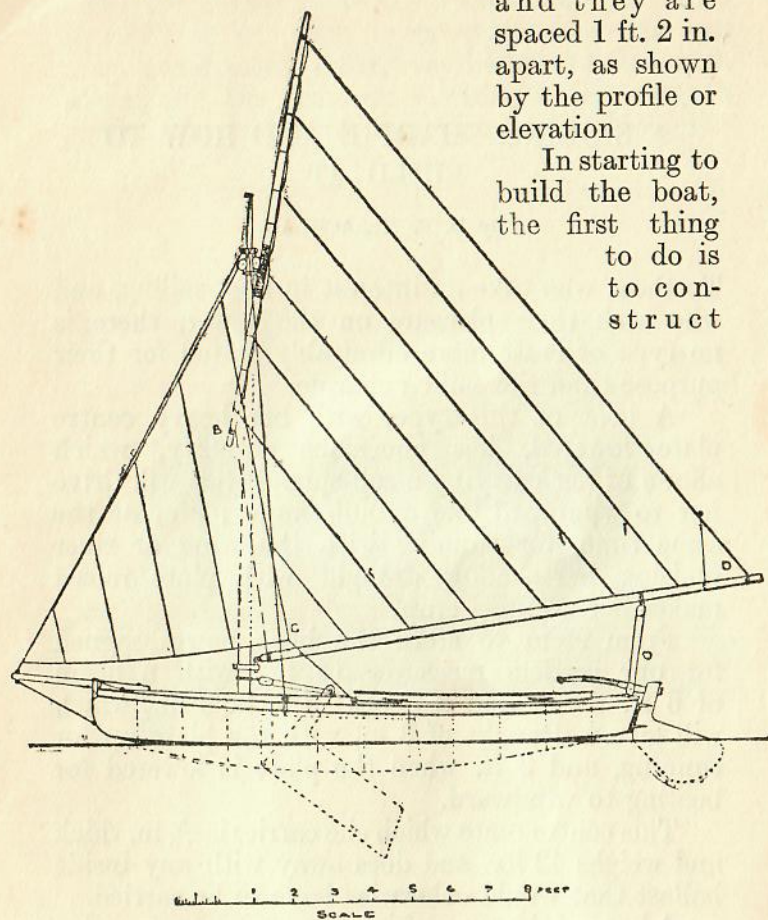


Fig. 1.

the frames as Fig. 3 These consist of the floor pieces A, which are $1\frac{1}{4}$ in. by $1\frac{1}{4}$ in. and the pieces

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B, to the shape of the sections, which should be enlarged on paper full size. This can be easily done by taking measurements from the scale at the foot of the drawings

In making the frames you will notice that there is a check 7 in. by $\frac{3}{4}$ in. to take the keel cut in all of them, and that those marked Nos. 4, 5, 6, 7 (Fig. 2) come in the way of the centre-

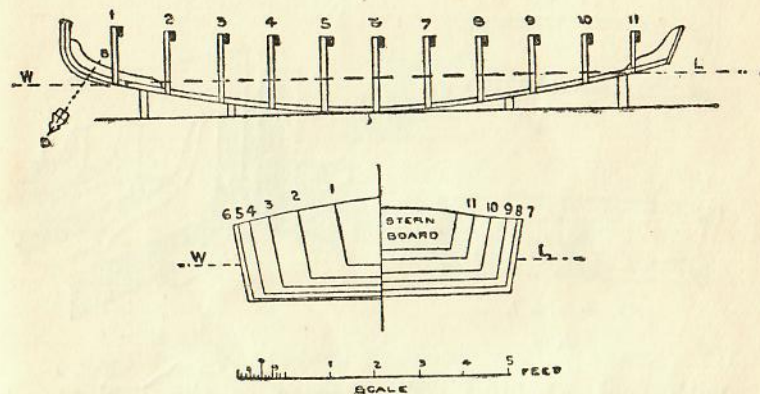


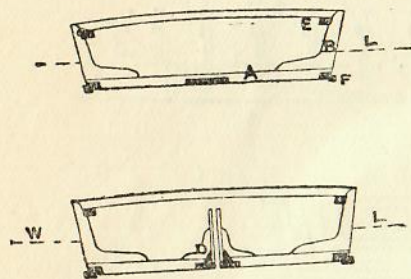
Fig. 2.

board, and are each in two pieces, having the end next the centreboard case cut away to allow room for the fillet D (Figs. 3 and 4), which you will afterwards see is necessary in order to make a watertight joint at that point. In making these frames you will have to allow $\frac{1}{2}$ in. all round for the thickness of the planking.

Coming to the knees, B (Fig. 3), these should consist of natural bends, preferably larch roots should be the wood selected. These knees can all be sawn from the one template or shape, as

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they are all set at the same angle, and should be bedded in white-lead before being screwed down to the floors. Having now got your frames constructed, you should turn your attention to the setting up of your keel. This is 7 in. broad by $\frac{3}{4}$ in. thick, and exactly 12 ft. 6 in. long. The keel should be placed on a plank, or, better still, a wooden floor, if you are fortunate enough to be building your boat in a shed that is blessed



Nos 4, 5, 6, 7.

Fig. 3.

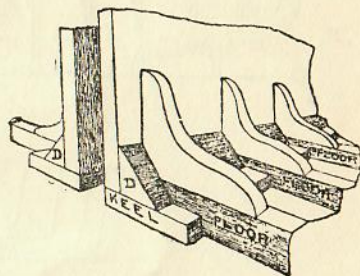


Fig. 4.

with such a thing. The centre of the keel at the point A (Fig. 2) should be screwed down with a single screw, and then the ends built up with blocks of wood and wedges until you have found the correct line of the profile. This can easily be ascertained by taking the measurements from the water-line downwards at the various sections. This water-line should be struck across all the sections, and if you refer to the profile (Fig. 2) it will at once show you how the work ought to be done.

I would impress upon you that this part of the work must be most carefully done; you

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should take great care to check the keel fore and aft and see that there is no twist about it. It must be perfectly fair, for there is nothing so awkward or so unhandy to steer as a boat that has got a twist, no matter how slight it is. A boat of that sort always keeps running up or off the wind, and yaws about in a most uncomfortable fashion

Before setting up the frames you should get

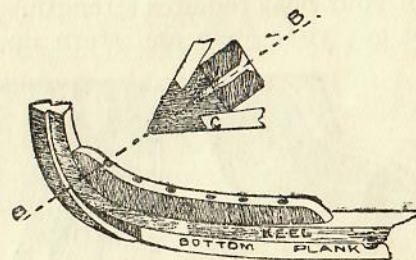


Fig. 5.

your stem and stern pieces up and in place. The stem is $2\frac{1}{2}$ in. by 2 in. thick, and should be sawn from a natural bend of larch wood. You will have to cut a rabbet along each side $\frac{1}{2}$ in. deep to take the side planking, as c (Fig. 5); a knee is then fitted in the inside (D, Fig. 5) to give strength, and should be bedded in white-lead and then screwed down to the stem with 3 in. screws, after which you can screw them down firmly to the keel.

Care should again be exercised in setting up your stem that you get it quite vertical, and to ensure this you should test it with a plumb-line.

The stern board, which is $\frac{5}{8}$ in. thick, should

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be cut to the drawing, allowing of course for the rake.

You will find that it is exactly 11 in. deep at the sides and $12\frac{1}{2}$ in. at the centre, and that it is bevelled top, bottom, and sides to come in with planking (see Fig. 6). You will also notice that the keel is checked into it at the foot A (Fig. 6). The knee B (Fig. 6) is of natural bend, and should be heavy and come well up the stern board, as this part of your boat requires strength.

Having got your stem and stern up, you can

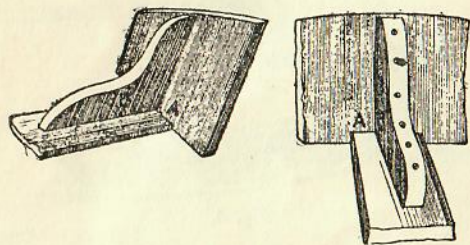


Fig. 6.

go on with the setting up of the frames. First mark off carefully their positions on the top of the keel, and slightly bevel the bottom and sides of them so as to give a fair surface for fitting the planks.

Care should be taken when screwing down the frames to get them on at right angles to the centre line of the keel, also be careful to plumb every frame as you set it up, as these are necessary in order to get a boat which is fair in the lines.

As soon as the frames are up, run on the small stringers that come under the beams E (Fig. 3), and as the beams are $1\frac{1}{2}$ in. deep, the stringer should

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be kept down that distance from the top of every frame. A small check will have to be taken out of the frames to allow of the stringer getting a good hold. The stringer is $1\frac{1}{2}$ in. by 1 in., and $1\frac{5}{8}$ -in. screws will be necessary for the job. The two lower stringers can also be put on; they are 2 in. by $1\frac{1}{4}$ in. and are checked into the lower corners of the floors F (Fig. 3). You will notice that they are rabbeted to receive the planking. This method of running stringers round the bilges and checking the planks into them gives a first-class watertight job, which is most essential in order to guard against the strains which come at this vital part, owing to the boat working in a seaway. You will find by this time that your boat has emerged very rapidly into a bit of good strong framework since you got the stringers on, and can now confidently tackle the side planking of her. This will, perhaps, be more interesting, for you will see the profile of the boat standing out as you get on. She is planked carvel with $\frac{1}{2}$ -in. yellow pine (carvel means when planks are put on edge to edge to form a smooth skin, being the opposite from clincher, which is the method adopted for building rowing-boats and other small craft).

Owing to her being wall-sided, the sides can each be done with one plank; but care has to be exercised in the fitting of it. A template or mould should be made as Fig. 7, which is simply a strip of thin wood tacked round the frames on the load water-line, and short pieces, as B B, nailed across it at each frame to the exact depth of the frame. This, when taken off the boat and allowed to spring flat, will give the expanded

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or exact size and shape the plank will have to be cut to. For fastening the plank to the frames 1-in. brass screws should be used and spaced about



Fig. 7.

2½ in. down the frames. They should be counter-sunk into the wood for about ⅛ in., this being afterwards filled up with putty, which will ensure a flat surface.

You should now get ahead with your beams and coamings, as you cannot do anything to the bottom planking till you have got more stiffening into her. You will notice that there is a beam

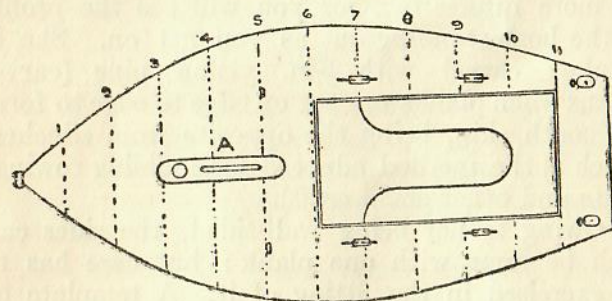


Fig. 8.

on every frame, and that those marked 1, 2, 3, 5, 6, 11, Fig. 8, go right across the boat; the others coming in way of the cockpit are cut at the coaming, except No. 4, which is cut at the centre line and a

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couple of small fore and afters fitted as A, A, Fig. 9, to allow of the head of the centreboard working. The beams have 2 in. of a round on them, and are 1½ in. deep by 1 in. thick, and can all be cut from the same shape or mould. The different lengths you should take from the boat herself, which will enable you to make a good fit and thereby prevent straining. They should all be slightly checked into the frames and then firmly screwed to them.

Having got your beams up and in place, line

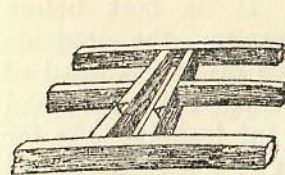


Fig. 9.

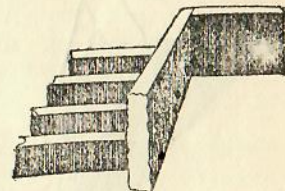


Fig. 10.

off the breadth of the cockpit (which is 3 feet) on the beams 6, 11, when, by placing a straight-edge or twine between these spots, the correct length of the carlings or cut beams can be ascertained. The coamings, Fig. 10, which form the framework of the cockpit, are 5 in. deep by ½ in. thick, sawn to the sheer of the boat and screwed to the carlings; those at the fore and aft ends of the cockpit should also be the same depth as the beam, but of course have the round on them instead of sheer.

Before starting your deck-planking you should get the centreboard case put in. The formation

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of the case will be seen by looking at Figs. 4 and 12. It consists of two pieces of $\frac{1}{2}$ -in. wood 3 ft. 10 in. long by 1 ft. 2 in. deep, with a clear space of $\frac{3}{8}$ in. between them for the centreboard to work in. As before mentioned, a small fillet bedded in white-lead is run round at the foot, D, Fig. 4, to give additional strength and watertightness.

By looking at Fig. 11, you will see how the ends of the case are made watertight. First, a piece, $\frac{3}{8}$ in., is inserted, and then pieces are screwed over them. It is best before screwing on the outside pieces to insert a thread of cotton dipped in white-lead to prevent leakage. As for the top of the case, it need not be boxed in, as it is high above the load water-line. After finishing up the

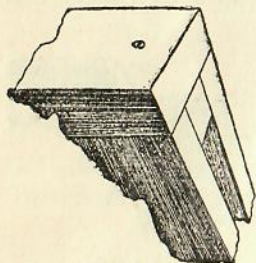


Fig. 11.

centreboard case, you should take a long $\frac{3}{8}$ -in. auger and bore a $\frac{3}{8}$ -in. hole through the keel at each end of the case, so that when the hull is finished the piece between the holes can be cut out with a keyhole saw. Also, at the forward end of the case, bore a $\frac{3}{8}$ -in. hole through the two thicknesses in order to take the bolt that hangs the centreboard. This bolt hole should be as close down on the keel as you can get it (see A, Fig. 12), and had better be done with a ratchet brace. After doing this you had better put in the mast step, the centre of which is 3 ft. 10 in. from the fore part of the stem. It should be about

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12 in. long, and firmly screwed down to the keel (see Fig. 13).

The cockpit seats you should next get on with, and, in order to give a finish to the boat, you

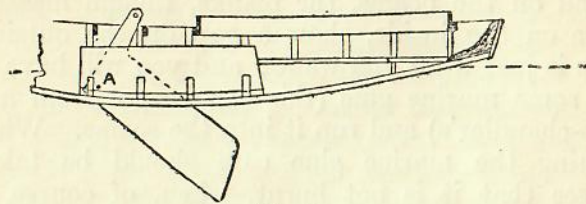


Fig. 12.

should make a round seat in the stern, beside rounding off the forward ends of the side one.

They should be boxed in all round, which will give good locker accommodation for spare gear, etc. The thickness of the seats should not be less than $\frac{5}{8}$ in., and the boxing can be $\frac{1}{2}$ in.

Now go ahead with the deck planking, which should be done in narrow lengths of 3 to 4 in. and by $\frac{1}{2}$ in. thick. You should start by striking the centre line of the boat along the top of the beams with a chalk line, and fit the plank next the centre line first. Then work out to the sides, where the planks should be allowed to project about $\frac{1}{2}$ in. to form a bead or moulding. Each plank should be securely screwed down to the beams by a couple of screws at each beam. The hole for the mast, which is $3\frac{1}{2}$ in., should be cut right above

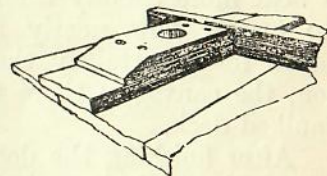


Fig. 13.

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the step which you have already fitted in. The position you can again get by marking off 3 ft. 10 in. from the stem head. You will notice that when laying your deck, owing to there being a round on the beams, the planks, though meeting close on the inside, show a gap on the outside. This is just what you want; and you will have to get some marine glue (this can be got from any ship-chandler's) and run it into the seams. When heating the marine glue care should be taken to see that it is not burnt, when, of course, it becomes hard and useless. It should only be heated enough to allow of it being poured into the seams. Marine glue is very much better for this purpose than putty or pitch, etc., as, owing to it being elastic, it comes and goes with the weather, which you require if you leave your boat moored out, exposed to sunshine and rain. If you make a good job of the deck there will be no need to cover it with canvas, although this method is resorted to in a great number of cases. Nothing makes a boat more shoddy than a canvas-covered deck, no matter how neatly fitted; and it may be taken for a certainty that, in nine boats out of ten, the canvas is there to cover a badly laid or caulked deck.

After finishing the deck, fit a small half bead round the cockpit coaming, and also round off the top edges of the coaming to give a finish. At this time you can also fit a piece of hard wood, preferably mahogany, 4 ft. long by 10 in., with a $3\frac{1}{2}$ -in. hole cut for the mast, also a slot cut for the distance of a frame space to allow of the head of the centreboard working as A, Fig. 8. This,

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if made from $\frac{5}{8}$ -in. or $\frac{3}{4}$ -in. wood will stiffen up the boat immensely in way of the mast.

Having got the deck about finished, and the boat assuming a rigid form, you can start the bottom planking. The screws that hold down the keel will have to be withdrawn, and the boat turned over on her deck. The slot between the two holes can then be cut out for the centreboard, after which you can proceed with the planking, which is $\frac{1}{2}$ in. thick. As she has got a flat floor transversely, the planks do not necessarily need to

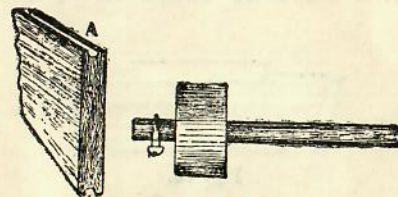


Fig. 14.

be narrow, and 12-in. breadths will do all right. The same method is gone through in planking the bottom as was adopted for the deck, only the edges of the planks will require to be bruised. This method of bruising is very simple, and should always be done in carvel-built boats, and is the only safeguard against leakage. A nail having a round head is inserted through the end of a marking gauge, as Fig. 14. When the edge of the plank has been planed to a good fit, the marking gauge is run along the edge, thus making a hollow along the plank where the wood has been compressed (A, Fig. 14). When you have done this two or three times and got the groove fairly deep, take a

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hand-plane and strip a few shavings off the edge until you come down to the compressed bit; after this it can be butted against the preceding plank and screwed down with 1-in. screws.

You will find, by doing this, that when you put your boat into the water the edges of the planks which you have compressed have swollen out, and thereby made a first-class watertight joint. You will also have to pay some attention to the two seams at the bilge, where the stringers meet the bottom and side planking. In this case you will have to caulk them with cotton-

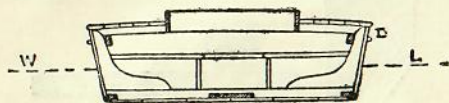


Fig. 15.

wick. The wick is driven into the seam with a mallet and caulking tool, which in appearance is not unlike a flat chisel. Care should be taken that the wick is not driven too hard home, or that it is put in in lumps. It should in all cases be evenly payed, and no great force should be used.

I may tell you that I have seen boats which had too much cotton driven into their seams spring the planks, after being some little time in the water.

By this time your hull is nearing completion, and there is only one little job to do before the painting begins. That is, the small moulding (D, Fig. 15), which has to be put on. This should

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be of teak or mahogany, and about $\frac{5}{8}$ in. thick, and should be placed about 4 in. down from the underside of the deck at midships, and should have a bit of a rise fore and aft. This you will see, however, by looking at the rigging plan, Fig. 1.

Now go ahead with the painting.

The inside will require not less than two coats, and for this part a light colour always looks best. Of course, when doing the inside of her you should omit the cockpit seats, centreboard case, etc., which ought to be varnished. The outside should get at least three coats of either paint or varnish, according to taste.

For my own part, I always prefer varnish for a small boat like this, which would look very well with her rail moulding picked out in gold. The deck, etc., at this time will also need varnishing, and the first coat should be put on thick, and allowed to find its way into any seam that may be open. The second or last coat should be put on thinly and allowed to dry hard.

The hull, I think you can now safely say, is about finished, excepting a few fittings, such as the floor-boards, rudder, and centreboard. Taking the floor-boards first, they are simply lengths of 6 in. by $\frac{3}{8}$ in. stuff, screwed to the floors; or, if you desire to have them portable, you can tie them together by screwing straps of wood to them underneath. When making the rudder, the shape should be drawn out on $\frac{3}{4}$ -in. wood, and then sawn round with a bow saw, afterwards trimming the edges up neatly. You will notice that the head is made up of three pieces—two side ones that are screwed to the side of the

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rudder, and one that is fitted in between them (A, Fig. 16), leaving a hole 2 in. by $\frac{3}{4}$ in. for the tiller.

The tiller should be about $1\frac{1}{4}$ in. thick, and thinned away where it goes into the rudder head. If you care to spend a little extra time on your tiller you can make a nice job by ornamenting it a bit; and, in fact, even a Turk's head worked in string round the knob gives the boat a smart and ship-shape appearance. You should then

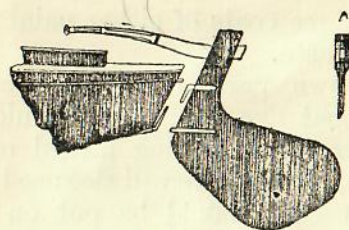


Fig. 16.

put on the galvanised pintles and eyes of the rudder. In the rudder the eye corresponds with the bottom pintle, and the pintle with the eye in the stern board. Coming now to the centreboard: you will have to cut the shape out of thin wood, and fit it in the place to make certain that it is not going to foul anything. This pattern should afterwards be taken to the iron worker, who will cut it out of $\frac{5}{16}$ -in. plate, and punch the two necessary holes at the same time. I strongly advise you to get your centreboard galvanised for all the little extra it will cost you, as an ordinary plate, after being some time in the water, rots and

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discolours the wood around it, besides constantly jamming and getting stiff to work.

This centreboard, you will notice, is not of the usual type. By this method the raising and lowering gear is outside of the case altogether, and does away with the chain working down through the bottom of the boat, as very often, when you want to lift your board in a hurry, you find the chain has got foul and refuses to work.

The board, when fitted, should be hung on a $\frac{3}{8}$ -in. galvanised bolt, bolted through the case with broad washers at nut and head to prevent them sinking into the wood. Before screwing the washers tight against the case a thread of cotton-wick dipped in white-lead should be wound round the bolt, so that when screwed up it will be perfectly watertight, for you must remember that this is below the load water-line.

Having got the hull finished off, it is the rigging of her that you have next to see to, and you will have to make a start with the spars. As you will see from the rigging plan, Fig. 1, there are four of them—mast, gaff, boom, and bowsprit. Taking the mast first, it is exactly $3\frac{1}{2}$ in. thick where it comes through the deck, which is 1 ft. 10 in. from the heel: at the top it is $1\frac{1}{4}$ in., and at the heel $1\frac{3}{4}$ in., thick. The exact dimensions top and heel have to be described on the spar with a pair of compasses. Then take the spar and fine it down to the required thicknesses, keeping its section a square (J, Fig. 17). After this the corners can be taken off, when it will assume an octagonal section (K, Fig. 17). When

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this has been done, take a hand-plane and again round off the corners; this will have the effect of making the section of the spar almost a complete circle, when it can be gone over with a

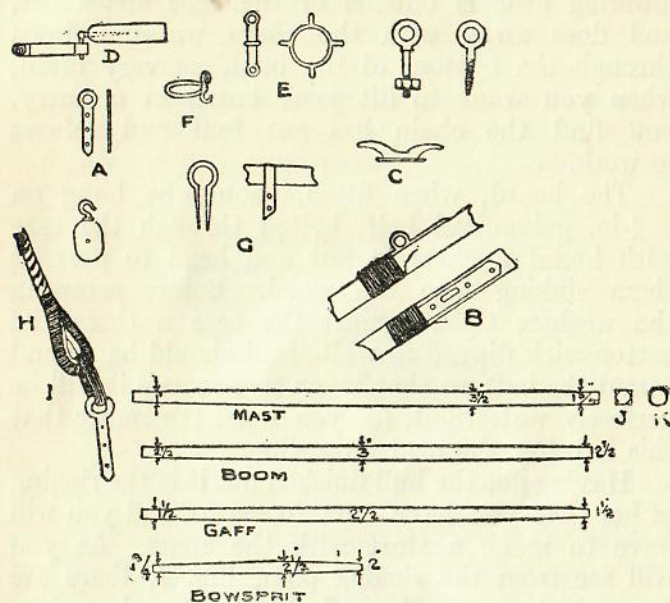


Fig. 17.

spokeshave, and afterwards rubbed up with rough sandpaper.

The three remaining spars are done in exactly the same manner, always remembering to bring them down to the required diameters in the form of the square section before beginning to round up. They should, when finished, get a coat of good varnish to preserve them from the weather.

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The different lengths of them you will find by measuring the rigging plan to be as follows: Mast, over all = 14 ft. 6 in.; gaff, over all = 11 ft. 3 in.; boom, over all = 13 ft.; bowsprit, over all = 3 ft. 6 in.

Having got the spars finished up, the fittings, etc., can be gone on with. I have shown drawings of these, so all you have to do is to take the dimensions from the spars and get them made. For the rigging of the spars you will need twenty fathoms of $1\frac{1}{2}$ -in. rope (fathom = 6 ft.) to bind sail with, and a piece of $1\frac{3}{4}$ -in. rope about the same length for halliards, main-sheet, jib-sheets, and stays, some thick codline for lashing, and if you intend making the sails yourself the amount of sailcloth will run to about 18 yards. I should tell you that, for all it will cost you, you would do better to get the sails made by a practical sail-maker, as it is a very difficult thing for an amateur to make a good setting sail. However, if you care to try it, your canvas should be got 36 in. wide, and slit up the centre, which will give you cloths of 16 in. after the hems have been taken off. Needless to say, however, the narrower you make your cloths the better setting sail you will have, and one less liable to give way to stretching.

Coming back to our list again, Fig 17, you will notice that A shows the fixtures for the shrouds, which are put on to the boat's side about a foot abaft the mast (see rigging plan).

The plate with eye on it (B, Fig. 17) is screwed to the gaff and then lashed with codline, or, better still, small-gauge galvanised wire. You will want a few 7-in. cleats (C, Fig. 17) to belay sheets,

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etc., also a few screw-eyes, thimbles, shackles, and ring-bolts.

The boom-holder (D, Fig. 17) is a $1\frac{1}{4}$ -in. band encircling the mast, with a swivelled pin driven into the boom. The mast-head band is shown at E, the traveller at F, and the bowsprit-head band at G, Fig. 17.

The running rigging is all done with $2\frac{1}{2}$ -in. pulley-blocks; their positions, etc., you will get by looking at the rigging and deck plans.

Having now taken it for granted that you are ready to set up your rigging, the first thing to do is to get the different fittings securely fixed in their respective positions, when, after having cut the halliards, stays, etc., to their exact lengths and led them through the blocks, at the same time fastening the heads of stays to the mast-head band by thimbles, with the rope becketed round them, as H, Fig. 17, the mast can be shipped. After setting up the mast the foot of the stays should be becketed to thimbles in the same manner; the only difference being that here they set up with codline, as I, Fig. 17, which allows of them being slackened or tightened at any time. You can now stretch your sail to the spars. It is lashed at the four corners—A, B, C, D, Fig. 1—and then laced along the gaff. The foot of the sail need not be laced to the boom, as when this is done, and you come to reef her, it is very awkward. Your sail should now be temporarily hoisted into position to see how it is going to set, and, if satisfactory, you can go ahead with the jib. As the bowsprit is so short there is no need to make it portable, and it should have the heel fixed by a

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$\frac{1}{2}$ -in. bolt passing through a beam and screwed up from below. When setting the headsail it should be shackled to the ring-bolt on the bowsprit end, the halliard being afterwards hove tight and belayed to one of the cleats at the foot of the mast, the other cleat being utilised for the lugsail halliard. The jib-sheets, you will see by the deck plan, pass through ring-bolts on the deck, and are belayed to cleats at the fore end of the cockpit; the main-sheet being belayed to cleats at the aft end of the cockpit.

And now I think your little ship is about finished, unless you intend occasionally to stay aboard, when you will require a cockpit cover. This can be made of canvas held down to the cockpit coaming by studs; or you can make it in the form of a portable frame consisting of three pieces of cane or bamboo bent to take the form of an arch across your cockpit, over which a canvas cover can be stretched.

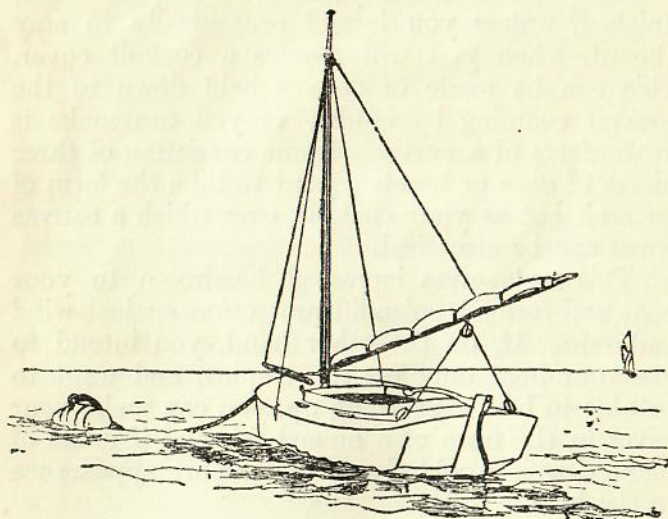
This style gives increased headroom to your boat and forms a splendid protection against wind and rain. If, on the other hand, you intend to use your boat only for short spins, and want to be able to lock everything up, you can make your cover in the form of a hinged lid, and if made of mahogany it would give a nice smart appearance to the boat.

And now I think I must bid you farewell, and leave you to make arrangements for the maiden voyage.

You have now got a boat which will either reach, run, or beat to windward, and no matter where you intend using her—for quiet river sailing,

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or cruising on the more open waters round our coast—you have a boat which, for handiness in short day trips, cannot be beaten, a safe, fast, and comfortable craft which can always be relied upon to bring you back, through wind and wave, tight and trim to the old anchorage.



HOW TO MAKE A SECTIONAL CANOE

By GEORGE PONTIN

I do not remember having seen a sectional canoe built to pack up and carry away in a very handy and portable state, and I think the accompanying designs will appeal to many readers as just the thing for the next holidays.

If a train journey has to be accomplished at first to get to the water, a canoe of ten or twelve feet long becomes somewhat of a trouble and is liable to get damaged *en route* as well, but when the twelve-footer can be made to take to pieces and pack up into one parcel of, say, five feet by two feet six, then the advantage of this type of craft becomes apparent.

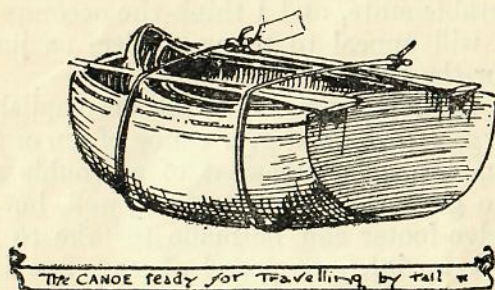
A glance at the accompanying designs shows three sections, each a watertight compartment in itself, which is another great advantage in this class of canoe; should one part get damaged or stove in or spring a leak, there will be no need to swim for it, as the canoe will still have plenty of buoyancy to keep afloat.

The canoe is covered with canvas, and made watertight in the usual way with oil and paint. Most canvas canoes are covered with unbleached calico, but I find that a coarser cloth is stronger and better for rough usage, and that known as "hessian," which can be obtained 72 in. wide,

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though a narrower width will be sufficient, will be found to answer very well. This can be obtained at a moderate cost per yard double width, so that the outlay, as far as the covering is concerned, is not very great. The canoe can be built to any size to suit the reader's requirements, but I find 12 ft. is a useful length, and it is to this size I have made out these designs.

It will be noticed that the three sections are



not of equal lengths, being 5 ft. 6 in. in the centre section, the ends being 3 ft. and 4 ft. respectively. This is done so that when the canoe is taken apart, the sections nest into each other and take up little space.

The drawings, though not drawn to scale, have all the necessary dimensions marked on them, and it will not be a difficult matter to put the little vessel together if the directions are properly carried out.

The first design shows the three sections packed up ready for transport, the paddles being strapped on the top, which helps to keep the whole together ;

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and, being of the same length as the midship section, do not lap over the ends.

To commence work, the keel will be the first thing to prepare, and must be free from knots and shakes ; in fact, all the timber used in the building should be quite free from any large knots, as these not only prevent the timber from bending where required, but will in all probability break

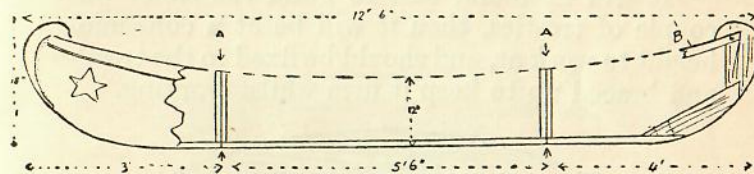


Fig. 1.

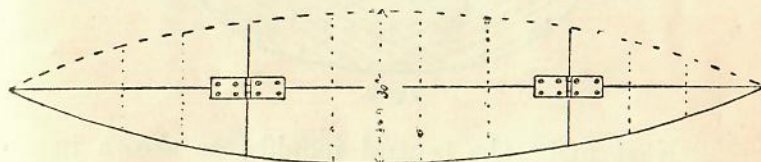


Fig. 2.

at some time later on when the canoe is in use, and then the work of repairing the damage may be a somewhat lengthy one. It will be best to go to a timber merchant, if there should be one in the locality, and procure from him what is necessary.

I find slate-battens very useful for the keel and the lengths to bend round, also for making the sections. Good battens can be obtained at a moderate cost per 100 ft. For the keel, select a good piece of 3 in. by 1 in., 10 ft. 6 in. long.

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The next thing to do is to fit on the stem and stern posts, and it will be seen from the plan at Fig. 1 how these are made. Brass screws are best for these ends, and see that they are long enough to hold firmly. The material for these ends need be only 1 in. thickness and the grain should go as shown by the lines. The curved edges, however, should be planed down to $\frac{1}{4}$ in.

It will be found best to build the canoe on a couple of trestles, then it will be at a convenient height to work at, and should be fixed to the trestles and braced up to keep it firm whilst working.

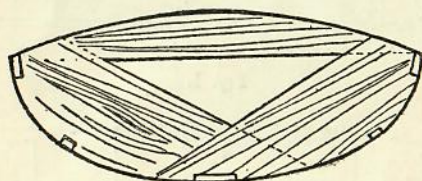


Fig. 3.

Next make the central moulds, as shown in Fig. 3. You will require four of these, which have to be fixed in pairs, as shown at A (Fig. 1), close together.

Half-inch wood should be used for these and halved together, as shown by the dotted lines (Fig. 3). A piece is cut out to fit over the keel and then nailed or screwed together, being temporarily kept in position by a spare batten. I have put the beam of the canoe at 30 in., which I think a very comfortable dimension, though if you wish to alter it it must be done now, as the moulds are being put in, but I do not advise less beam; in fact, I built one with 3 ft. beam and increased

SECTIONAL CANOE

draught and found her always a roomy and safe craft.

Next we want a couple of clean battens, 2 in. by 1 in., about 14 ft. long; bend them round, as shown at B (Fig. 1). These will not require any steaming, but should be allowed to take a natural bend, just touching the top of the moulds and finishing at the ends, as in C (Fig. 6). The moulds should be further fixed by corner pieces, as shown in Fig. 4 at D.

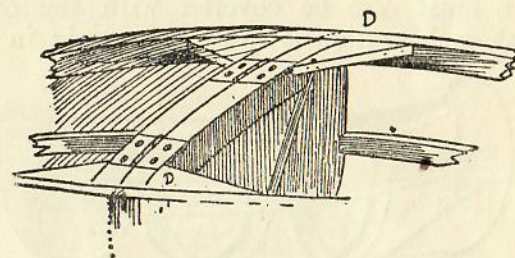


Fig. 4.

Two other strips, $1\frac{1}{2}$ in. by $\frac{3}{4}$ in., should now be bent round about half-way and fixed also, letting them into the moulds to come flush with the outside. The next thing is to put in the ribs. These are best made of bent timbers, but I have found barrel hoops answer very well, if they are of good quality and well screwed together. Two will be required in each of the ends, and three or even four are necessary for the midship section.

The next proceeding seems somewhat like an act of destruction, for, taking a saw, we cut the framed canoe into three parts, cutting through the framing and keel between the moulds, as indicated by A (Fig. 1).

CANOES, DINGHIES, AND PUNTS

We are now ready to cover the sections with canvas. Procure the material as described previously, and, having provided ourselves with a couple of packets of $\frac{1}{2}$ -in. tinned tacks, we turn the compartments upside down and commence to put on the covering. This must be put on very carefully to get rid of any folds, pulling it tight away from the keel, folding the edges under to the bow and pulling the canvas over and tacking down on the inside of the top strake, shown at B. The ends E must also be covered with the canvas, so that each section is quite watertight in itself.

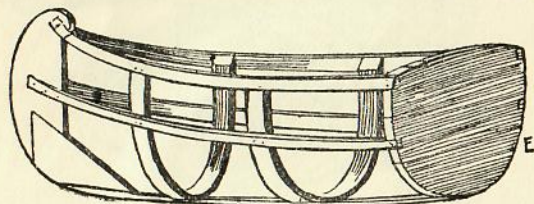


Fig. 5.

When this is done paint the whole of the canvas with boiled linseed oil, and let it remain until quite dry, which will take a day or two.

Meanwhile we can get on with the bottom boards, which are required for the occupant to seat himself on in the central compartment. These are cut to fit in, as indicated in Fig. 6. We can also make the paddles, which should be cut from a length of 5 ft. 6 in. by 2 in., tapering at the ends and being planed off straight at the end for fitting on the blades. The method is shown in Fig. 7, though they can be shaped from one piece of wood. The paddles—two only will

SECTIONAL CANOE

be required—should be painted about half-way up; the handles look better if oiled and varnished only.

When the first coat of oil is dry on the canoe, give it another coat, adding this time a little white lead and driers, and let this dry also.

We now come to the joining of the sections, which is best done by good strong brass hinges and screws (see Fig. 2); or, if preferred, bolts and nuts could be used; but there is always a chance of water coming through with these. For the tops of the sections (Fig. 4) a smaller pair

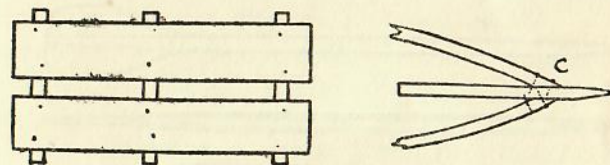


Fig. 6.

will suffice. Screw all in position, and you will find the canoe as rigid as before, if well made.

When unscrewing, take off the part of the hinge from the middle section, leaving the hinge on the ends, and fold it back, taking care not to lose the screws. Now put the 4-ft. end inside the middle compartment, and the 3-ft. end inside the 4-ft. part, and you have a compact parcel with plenty of room left for camping utensils and luggage, which can be fitted into the top section. Lash on the paddles, as shown in our first drawing, and you have something to carry it by.

You must paint the canoe to suit your own

CANOES, DINGHIES, AND PUNTS

taste, but, as it is of a Red Indian design, it may be just as well to decorate it a bit, as the Indians do. The Indians build of birchbark, and paint quaint designs on the bows with red and yellow paint; so that if we paint our vessel grey or chocolate topsides, with a yellow star or moon and a red and yellow band round the hull, it would be very effective. Two coats of paint are necessary for the bottom, and this may be of a darker tint, though no waterline need be put in if painted all one colour. For the interior, nothing looks better than white, and all woodwork should be

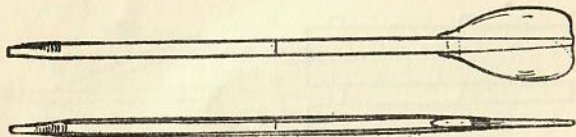


Fig. 7.

treated to a coat of paint before being covered.

A ringbolt is handy at the ends inside, and a painter spliced on. Then you will be able to make the canoe fast to the bank in some shady spot and enjoy your outing. You need not be alone, however, as the craft we have described will easily carry two, and is not overladen with a young party of three or four. With ordinary care and an occasional coat of paint, the canoe will last for years, and should be the means of providing many pleasant holidays. When not in use the canoe can be packed together and stored under cover, as it takes up very little space.

THE BOY'S OWN SKIFF AND HOW TO BUILD IT

By F. H. HOBDEN

FOR many reasons, winter seems the best time for amateur boatbuilding; you have the advantage of working more comfortably in cool weather, and then, when the hot summer time comes, you have a chance of thoroughly enjoying it, as your boat is ready for use.

In designing a boat there are many things to bear in mind. I intend giving you here the lines of a skiff which can safely carry four persons, and can also be easily rowed by one, and is moreover capable of carrying a small sail to take you over the tide when the wind is fair (that is, on the quarter or dead aft).

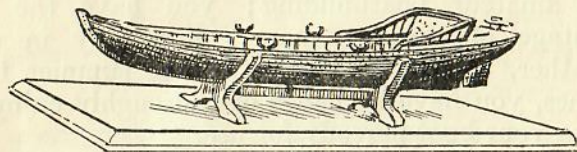
She is not intended for a sailing-boat, viz. one capable of sailing on a wind; as those who have had any experience in sailing know well, a shallow-draught boat with but little keel is not suitable for sailing with a head wind, but will blow away to leeward like a paper bag.

Up the river, however, with a fair breeze, if you can stick up a small sail, it will often save you a long row, and that is a consideration in the hot weather.

CANOES, DINGHIES, AND PUNTS

This will be found a very useful-sized boat, in which you can take out two or three friends for a spin on half-holidays, and the locker aft will hold plenty of "grub" if picnicking or camping out is intended.

Those who do not go in for large work sometimes take a delight in model-making, and a well-built model of this skiff, carefully finished off, would form an attractive ornament for an entrance hall if mounted on a stand and placed under a glass case to keep off the dust. Moreover, it is



THE MODEL.

a very usual and useful custom to make a model before building the full-size article. I think, therefore, I had better give you a few hints on making the model before we go on with the larger boat.

A model built to the exact size of the lines given in the following diagrams would be very satisfactory, and thin veneer of some fancy wood might be used for the planking, or even thin cardboard (that known as "Bristol board," for instance) would do, and a little glue and some fine pins used for fastening the planking on, which could then be stained and varnished to represent mahogany.

An easy method of building the model is

THE BOY'S OWN SKIFF

to cut out the different moulds or sections from soft deal about $\frac{1}{4}$ in. thick, fix them temporarily in position to the keel (which should first have the stem and stern posts fixed to it) by pins, also pin on a couple of thin strips at the gunwale and a central one on top to keep all square.

Now turn the frame of your model upside down; and it is better to attach it firmly to a stout board whilst working at the planking, for should the

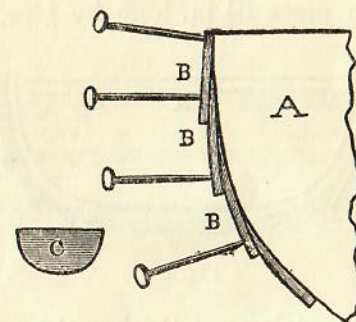


Fig. 1.

framework get twisted sideways in the least, it would quite spoil the shape of the boat when planked up, and you cannot be too careful over this.

To fix it firmly to the board the stem and stern posts may be left an inch or two longer than is needed for the boat, and can afterwards be trimmed to shape when the boat is removed from the board.

All being fixed securely, cut a number of strips of the veneer or card, whichever you intend

CANOES, DINGHIES, AND PUNTS

using, and lightly tack them on to the frames with pins. Only use sufficient force to keep them in place, and leave the pins sticking out, as at B B (Fig. 1), A being a portion of one section.

- Each strake or plank must be cut to the right curve to allow it to lie fairly along each section and touching all without a twist.

When you have the planking all on, prepare about a couple of dozen strips of American elm by dividing a piece $6\frac{1}{2}$ in. long by $\frac{1}{8}$ in. thick with

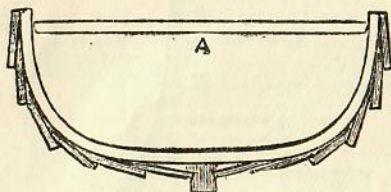


Fig. 2.

a penknife into strips not thicker than an ordinary match, and sandpaper them smooth, and round off the front edges, as in section c, which shows one much enlarged for the sake of clearness.

When they are all ready, place them in a basin of hot water for about five minutes or so, and they will then be so soft and pliable that you can easily bend them to any curve without cracking or breaking off.

Have some strong hot glue ready, and taking one strip at a time, glue the back of it, and bend it down across the keel inside the boat, and keep it in position by a pin or tack driven into the keel, the upper ends being kept in place by the

THE BOY'S OWN SKIFF

stretcher (A, Fig. 2). Fix each rib in the same way, spacing them $\frac{3}{4}$ in. apart, and then, on the following day, when quite firm and hard, cut off the projecting ends level with the gunwale. Instead of glue you can use fine pins to fasten the ribs to the planking with, but of course it takes much longer; but whichever method you adopt, time must be allowed for the ribs to get dry and set firm. On removing the sections, which is quickly done by pulling out the pins, a rib must be put in place of each frame removed.

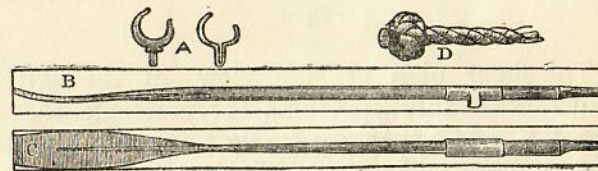


Fig. 3.

Thicker strips are now fastened round the gunwale to strengthen the boat, and thin mahogany thwarts or seats cut out and fitted, also the back-rest and covered portion at stern; the rudder and yoke might also be of mahogany.

Four rowlocks, made of brass wire (A, Fig. 3), can be fitted into holes in edge of gunwale. Two pairs of sculls are required; they can be cut out of soft deal, and, when leathered and varnished, look very well. B and C give the top and side view of same, showing how to cut them from the square block, which for this model should be 10 in. long.

CANOES, DINGHIES, AND PUNTS

The four following diagrams show the exact size for building the model, and for the full-size boat can be easily enlarged, as they are scale drawings of one inch to the foot.

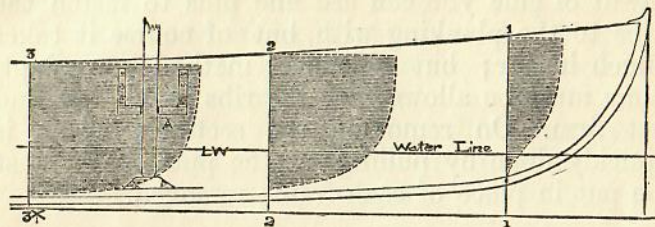


Fig. 4.

The sheer plan or side view of the skiff is divided into three portions for convenience. In Figs. 4, 5, and 6 they are drawn to overlap slightly, so that there will be no difficulty in fitting them

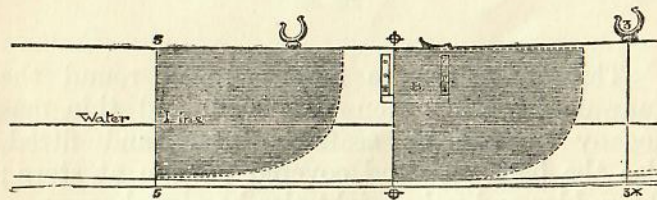


Fig. 5.

together by making a tracing, taking care to keep the bottom or base line continuous, the position of overlap being marked x.

The vertical numbered lines show the exact position for each section, which are correspondingly numbered in Fig. 7, one half being the forward

THE BOY'S OWN SKIFF

moulds, and the other side containing the after ones and transom.

The line marked L W on the sheer plan is a water-line, and is also marked across each section,

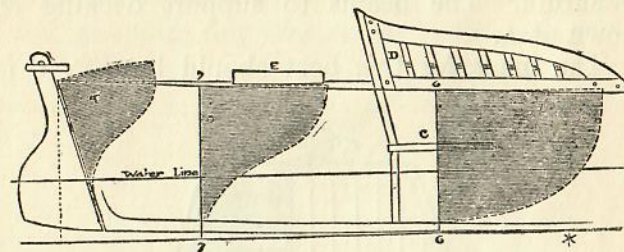


Fig. 6.

and when setting these up, care must be taken that this line is the correct height from the base line as marked on the sheer plan. If this were

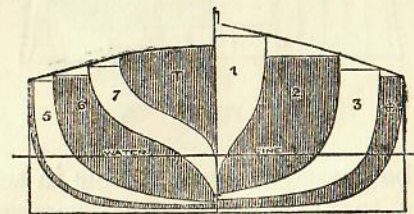


Fig. 7.

not attended to, the curves of the boat would be all out of place.

The position and width of the seats are shown at A, B, and C in Figs. 4, 5, and 6, and the back-rest at D. The whole of the boat aft of this seat

CANOES, DINGHIES, AND PUNTS

is covered in to form a locker fitted with a small hatch on a raised coaming E, also shown in top view at Fig. 8. Narrow planks should be used to deck this portion with, as they are not so likely to shrink. The beams to support decking are shown at A.

The mast for this boat should be 7 ft. 6 in.

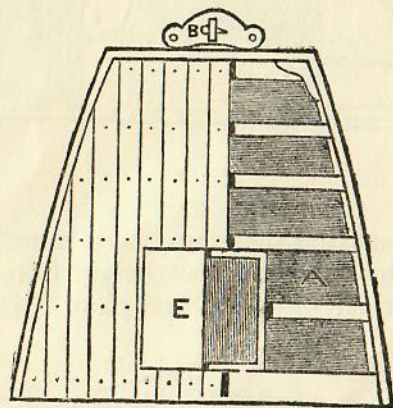


Fig. 8.

long, and be passed through a hole in seat A, and stepped on to a block of wood screwed to the keel, furnished with a square hole to take the foot of the mast. The sail is that known as a lug-sail (Fig. 9), and looks best if made up of narrow strips of material not more than 2 in. wide, and for a light sail, thin linen or calico is sufficient; but it should be roped round with a thin cord to strengthen it. It should measure 4 ft. 6 in. or 5 ft. along the head A, 3 ft. 6 in. on luff D, 7 ft. along

THE BOY'S OWN SKIFF

leach B, and 6 ft. 6 in. on foot C, which need not be roped. When making the model, you must, of course, read inches for feet.

The yard A should be at least 6 in. longer than the head of sail, and the diameter of mast 3 in., gradually tapering towards the top, where

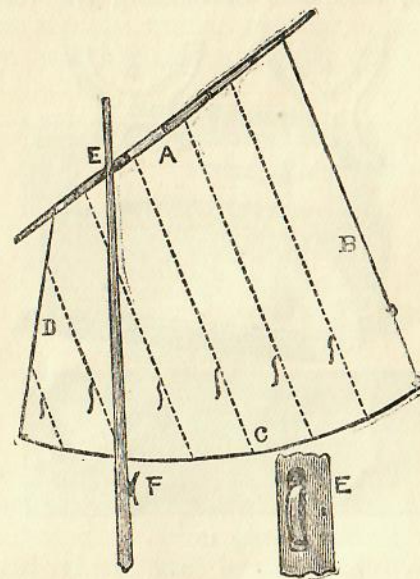


Fig. 9.

it need not be more than $1\frac{1}{2}$ in. About 9 in. down cut a narrow slot, and insert a small sheave E to carry the halliard, which is made fast to an ordinary cleat screwed on at F, and this is all the fitting necessary, for you cannot have the gear too simple for this sort of skiff.

The model rudder can be hung on brass-wire

CANOES, DINGHIES, AND PUNTS

pintles, and a yoke B (Fig. 8) fitted to the top, and the yoke-lines, of silk cord, should be long enough to pass over the back of after seat, and can be finished off with a "turk's head" worked on each end (D, Fig. 3).

The method of setting up the keel, stem and stern posts, and also of making the rest of the

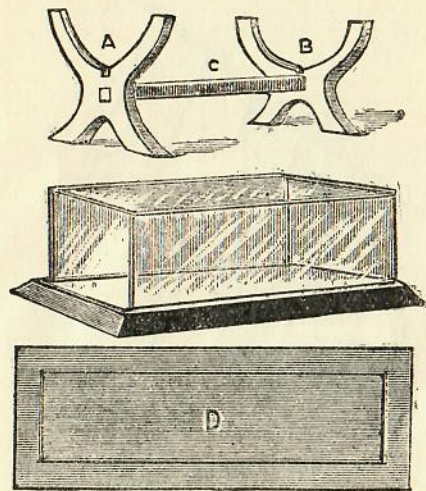


Fig. 10.

internal fittings for the model, you can follow from the instructions I will now give for building the full-size skiff.

To finish the model off completely, however, you should make a light stand for it, as in Fig. 10, the upper part being cut out to fit the boat at A B, the bar c holding the two supports together.

A small glass case to keep it in can be easily made. Take a $\frac{1}{2}$ -in. deal board 22 in. by 7 in.,

THE BOY'S OWN SKIFF

and with a narrow chisel about $\frac{3}{8}$ in. wide cut a groove in it all round, 1 in. from the edge and a $\frac{1}{4}$ in. deep, as in top view D, the outer edge being afterwards chamfered off and then either stained and varnished or painted with Brunswick black. While that is drying, cut four strips of glass 4 in. deep to form the sides and ends, drop them in the groove already made, and cut another piece for the top, which must be slightly wider so as to

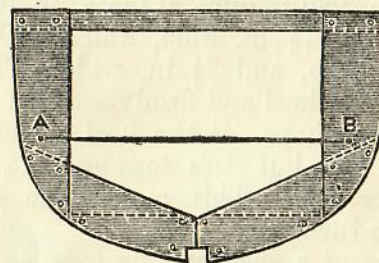


Fig. 11.

rest on the sides. Now cut some $\frac{1}{2}$ -in. strips of either brown or black paper, and having coated them with hot glue, bind the edges of the glass together with them, and leave it until dry.

This is a simple and neat method of making a glass case quickly, and if extra strength is thought necessary, line up the inside angles with a narrow strip only $\frac{1}{4}$ in. wide.

We will now proceed with the full-size skiff, and the first thing to do is to get the paper sections ready, then cut out the moulds or frames to build on.

These must be the same size and shape as the paper sections, and may be of any rough wood,

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but should be strong and braced together well, as in Fig. 11. If you cut the paper sections yourself, you must allow $\frac{1}{2}$ in. all round for the thickness of planking; this amount must of course be *taken off* the sections. Each mould should have the water-line marked on it, and a string can be stretched across tightly at that place, as at A B.

The frames being all prepared, you can make the keel. This should be of either oak or elm; the latter is cheaper, and holds the nails better, I think. You will require a piece 16 ft. long by 2 in. deep and $1\frac{1}{2}$ in. wide, and another 12 ft. long, 1 in. deep, and $2\frac{1}{2}$ in. wide. This is laid on top of main keel and firmly screwed to it after it is bent to shape, as the keel is not intended to be quite flat, but rises fore and aft, as shown in the sheer plan. This makes the boat more handy when turning.

The floor of a shed can be used as a foundation to build on if of wood; but a stout plank 18 ft. by 2 in. thick and 6 in. deep, raised up on short legs or trestles, as in Fig. 12, which shows one end of a plank so fitted, is much better and easier to build on.

The keel is now laid on top of this plank and secured by a stout screw at c; the ends are then raised up to the exact curve shown in sheer plan by a couple of wedges A, B, a short nail holding all in position, while the inner keelson is screwed on, as in section D.

The stem is then sawn out to the correct shape, preferably of oak, and scarfed on to the keel at A. It should be further secured by means of a knee screwed on inside, as at A (Fig. 13).

THE BOY'S OWN SKIFF

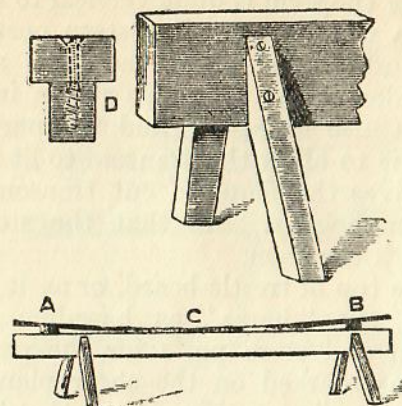


Fig. 12.

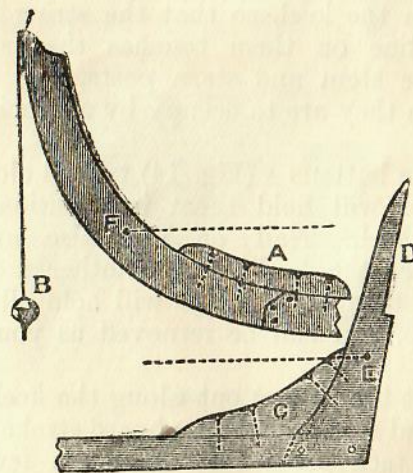


Fig. 13.

CANOES, DINGHIES, AND PUNTS

Take care the stem is quite vertical to the keel. Test it by a plummet B. The stern post is now sawn out and scarfed on in the same manner; it should rake aft at the angle shown in Fig. 6. A knee C is also necessary, and the portion cut away at D is to allow the transom to fit in close. T (Fig. 7) gives the shape to cut transom, which should be mahogany. See that the stern post is in line with the stem.

From the top of trestle-board, or as it is generally called, the "horse," as base-line measure up the stem and stern posts for the position of water-line, as marked on the sheer plan; drive in a couple of nails E F (Fig. 13) at that line, and stretch a thin string between them, passing it through each section or frame, and set them up square with the keel, so that the string marking the water-line on them touches that stretched between the stem and stern posts, just marking the position they are to occupy by a pencil line on the keel.

Two thin battens A (Fig. 14) tacked along their upper edges will hold them in position square with the keel. Nail on one also amidships directly over the keel; and another B on each side at the turn of the bilge will hold all firm for planking-up, and can be removed as you get up to them.

Now cut the rabbet out along the keel and up the stem and stern for the garboard strake to lie in.

If you tack on a thin batten a few inches from the keel A (Fig 15), it will form a guide for the set square B, which, worked along it, will give the correct angle for cutting out the rabbet

THE BOY'S OWN SKIFF

along the keel c. A sharp chisel and rabbet plane will be required for this job; and before

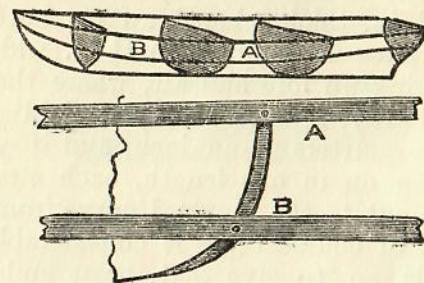


Fig. 14.

cutting the rabbet up the stem, screw on an inner piece, as at section or top view D, so that there

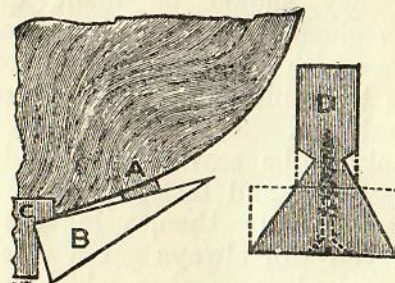


Fig. 15.

will be plenty of wood for the butt ends of the strakes to lie up against and be nailed to, as shown by the dotted line, the shaded portions being the wood to trim away.

CANOES, DINGHIES, AND PUNTS

Planking up requires great care in preparing each strake as well as in putting it on. I suppose you will use pine or red deal for this. Mahogany is better, but comes very expensive. The wood should be $\frac{1}{2}$ in. thick, planed up on both sides, and the strakes not more than $4\frac{1}{2}$ in. wide amidships, tapering up fore and aft, where they must be also planed thinner. They should overlap about three-quarters of an inch, and if you put the planking on in one length, each strake will have to be cut to the required curve from a wide plank, and of course there is considerable waste of material; so, to save that, most builders use a mitre-box to form a long scarf, and so join the planks up in two pieces.

You can make one yourself by screwing a couple of boards A A (Fig. 16), 1 in. thick by 18 in. long on edge $\frac{3}{4}$ in. apart, to a stout base-board B. They should be made quite firm and rigid by glueing small chocks of wood c c on each side, then with a fine saw kept quite vertical, cut through both pieces at an angle of 45° , as shown by dark line.

The plank to be scarfed is placed between the uprights at D, and fastened in by a couple of small wedges E E; then, using the saw-cuts as a guide, you will always get a true joint in fastening one plank to another, which enables you to use up pieces of wood which would be useless if the strake had to be in one length throughout.

Another very useful tool in boat-building—in fact, one you cannot well do without if you are working alone—is a clamp, or, rather, several; half-a-dozen at least will be wanted.

THE BOY'S OWN SKIFF

The ordinary iron screw clamps are heavy in the larger sizes, and expensive; but you can easily make a few for yourself for next to nothing in this way:

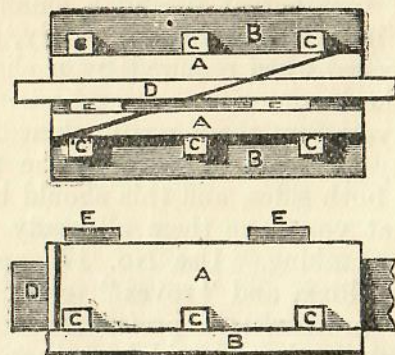


Fig. 16.

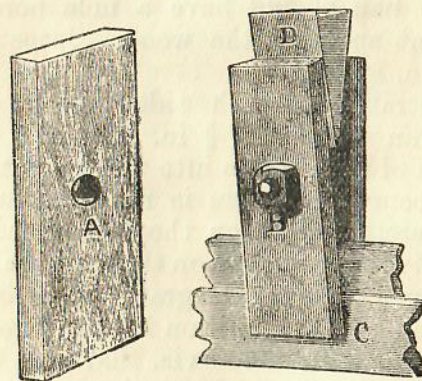


Fig. 17.

Take a couple of pieces of oak or hard wood of any kind, say, 1 ft. long by 2 or 3 in. wide, and $\frac{1}{2}$ in. or $\frac{3}{4}$ in. thick; drill a hole in the centre of each, as at A (Fig. 17), and insert a $2\frac{1}{2}$ -in. bolt B.

CANOES, DINGHIES, AND PUNTS

The end of the bolt can be slightly burred over to prevent nut from screwing off.

In use the clamp is placed over the strakes to be held together at C, and a small wedge D is knocked in, which holds all firmly, and is instantly released when required by a slight tap at side with the hammer.

Unless you buy them ready planed, you will have plenty of work in dressing the planks up smooth on both sides, and this should be done at first, so that you have them all ready when you commence planking. Use No. 17 copper nails, about $1\frac{1}{4}$ in. long, and "roves" to fit; also buy a few fine bradawls. I prefer those of square section myself; they should be rather finer than the nails.

Every nail should have a hole bored for it, to prevent splitting the wood. Space the nails about 3 in. apart.

Ten strakes on each side will be sufficient, allowing an overlay of $\frac{3}{4}$ in. to each; so divide the edges of each frame into ten by pencil-marks, and, of course, as there is more surface on the midship section than on those fore and aft, the spaces between the marks on those will be narrower. These form a guide for the gradual tapering of each strake, and give the position for top edge of same.

The garboard strake—viz. that next the keel—is the first to fit, and requires care. Do not cut off to length before fixing partially, as the necessary turn or twist takes up the length, and you might find you had cut it too short to fit properly against the stem and stern post, which it should do accurately.

THE BOY'S OWN SKIFF

You can fill up any small space with white lead, putty, or pitch; but, with care, it is not required, and shows poor workmanship.

If you find it difficult to lay this strake in one piece, make a scarf about the centre; but if you put a scarf in the next and following strakes, you must arrange that they do not all come in one place over each other, as that would make the boat weak amidships; so have some forward and some aft of that line. When you have the garboard strake fixed securely on one side, put one on the other, building each side up with single strakes. Some builders plank up one side entirely before starting on the other, but you are much more likely to get it out of line in that way, and I would not recommend you to do so. Before putting on the second strake you must bevel off the outer edge of the first one to allow the upper one to lie close against it, as at A (Fig. 18).

The greatest amount of bevel is at or near the midships section, where you get most curve. If this were not done the upper plank would only touch against a sharp edge, as at B, and you would not get a watertight join. The planks should also be thinned down with a plane, both fore and aft, for the sake of neatness, and so that they will lie close.

Having planed the bevel, place your second strake with its top edge level with the second row of marks on sections, and fix it temporarily to them with a tack, and to the lower strake with a few clamps. Then with a lead pencil draw a line against the top edge of garboard strake, then remove the plank, and this pencil-line will

CANOES, DINGHIES, AND PUNTS

give you the shape to cut the bottom of strake, allowing $\frac{3}{4}$ in. for overlap; saw off the surplus wood, and then replace the strake and nail on.

Each plank must be treated in same manner; the top strake for gunwale may be slightly thicker, and if mahogany is used for this, it makes a nice finish to the skiff.

The nails up to the present have been simply driven through, but when the planking is all on, you can proceed to rivet them up.

You should get some friend to help you with this. Let him hold a heavy hammer against the head of nail *r* (Fig. 18), while you place the "rove" or "burr" *d* on over the point and drive it well home against the wood. To do this properly you require a flat-ended punch with a central hole large enough to take the nail in easily, as at *c*. The nail is now cut off near the rove, as at *e*, and is then riveted over, thus drawing the two planks tightly together.

The nails being all fastened off in this manner, you can remove the frames and get the ribs in. These may be either cut out to shape from the solid, or thin strips of American elm can be bent round, and this method makes a very strong and springy boat, besides being much easier to do.

Saw some strips $\frac{3}{4}$ in. wide by $\frac{1}{2}$ in. thick, plane the front and two sides, and round off the front edges, and have them long enough to go right across the keel from the gunwale on one side up to the other, at least in the middle portion. Forward and aft you will have to rib each side separately, as the bend is too sudden.

Space the ribs pretty close together if you

THE BOY'S OWN SKIFF

want a strong boat. Eight inches will do, and ribs of this size may be bent cold; but thicker ones would require steaming.

Drive the nails to fasten them from the outside of planking in through the rib, and finish

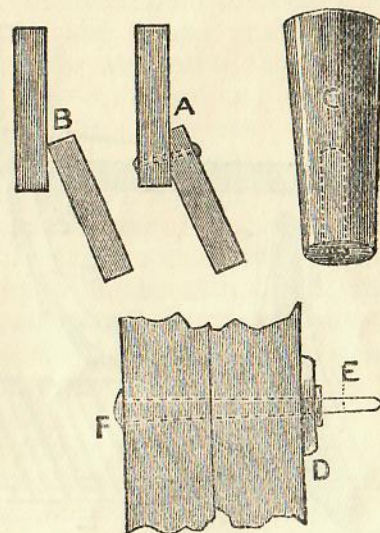


Fig. 18.

off with a rove or by doubling the end of nail back again; but the rove is the better way. The gunwale may now be strengthened by nailing on an inside strip about $1\frac{1}{4}$ in. by $1\frac{1}{2}$ in., and finish off both fore and aft with oak knees, as in Figs. 4, 5, and 6. The stringers, or horizontal strengthening strips, should also now be nailed on, and the thwarts, or seats, cut out and fixed by oak knees,

CANOES, DINGHIES, AND PUNTS

as in Fig. 19, where A shows the seat resting on stringer B, nailed to rib C, and the knee D binds all together firmly.

Stretchers to place the feet against are also necessary. Make them about 4 in. deep, and fit racks for them to rest in on each side, so that you

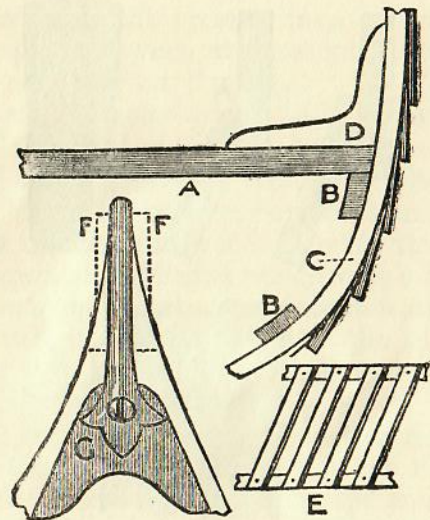


Fig. 19.

can regulate the distance from the seat. Three spaces will be sufficient to suit most persons, so screw or nail four thin strips to the stringers, as at E.

The "burdens," or floor boards, can now be fitted, and should extend as far as the lower stringers.

Any lady who is your passenger will thoroughly

THE BOY'S OWN SKIFF

appreciate the back-rest to after seat, and it should be made of mahogany, as also should the top of covered-in space, or locker, and it is better to use very narrow strips for this to prevent shrinkage; and if tongued and grooved, all the better. Make the coaming of hatch $1\frac{1}{2}$ in. deep, and screw on a ledge under the lid to keep it from shifting.

You can buy brass "gudgeons and pintles" for the rudder at marine stores, where you can also get the rowlocks and other fittings. Use white cotton rope for the yoke-lines, and you should also get some galvanised half-round iron rod $\frac{1}{4}$ in. and $\frac{1}{2}$ in. wide for the keel band. Drill holes for screws every 6 in., and countersink them so that they will lie flush with the surface. Carry it right up over the stem head, and when it is firmly fixed plane the stem away on each side until it is no thicker than the iron band, as at F F, which also shows the way to finish off the band at G.

The skiff can now be smoothed off with glass-paper, and after being well dusted out give it three coats of boat varnish, leaving time for each coat to dry before putting on the next.

It is better to buy the sculls ready made, as special tools are required in making them which are useless for other work. And now, having got your boat complete, you will want to put her afloat; and I wish you all many a pleasant day in her.

THE "IMADA," AND HOW I MADE HER

By G. H. BAILEY

THE "Imada" is the name of my punt, with which I drift down the stream of life—which in my case is a very small trout stream, flowing slowly and silently through countless water meadows, eventually finding its way into the river Itchen at a spot just below Winchester.

There are many fellows living near such streams who cannot utilise them because the building of a small boat to them is a matter of great difficulty and expense; and it is for them that I here describe the building of a small flat-bottomed boat, which can be punted, paddled, or oared along, and which only draws an inch and a half of water.

From the instructions given it will be found easy to build; but, of course, great care must be taken in getting the measurements exact, and the seams well caulked to prevent leakage. Fig. 1 is a plan of the boat, the general dimensions of which are: Length, 12 ft.; beam, 4 ft.; depth, 14 in.; stern board, 3 ft. 2 in.

We will begin by making the bow-piece, which is cut out of a block of elm 10 in. by $10\frac{1}{2}$ in. and 10 in. deep. Mark out the top of the block according to the dimensions given in Fig. 2, and carefully saw it to shape. Having finished the bow-piece we must now cut out the boards for the sides. The most suitable wood for this purpose is tongued and grooved deal, 7 in. wide and 1 in. thick.

THE "IMADA"

Four boards, each 12 ft. long, will be required—two for each side. See that they are well planed,

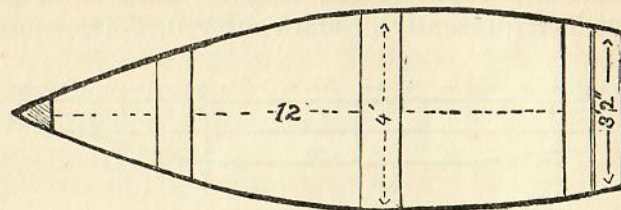


Fig. 1.

and select the boards so that the tongues and grooves fit tightly. Fasten each pair together

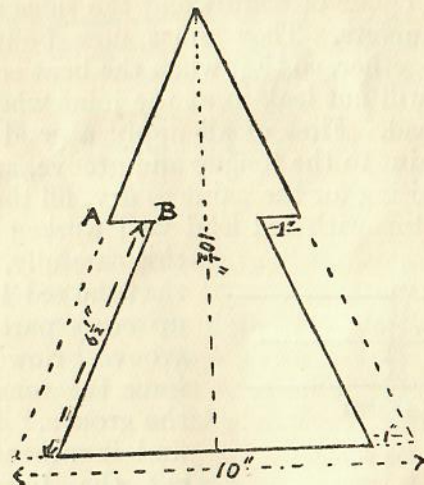


Fig. 2.

so that they can be taken apart again without damage to the tongue.

CANOES, DINGHIES, AND PUNTS

At one end measure A E (Fig. 3) 10 in. from the top (in your measurements you must not include the depth of the tongue, which is to be planed off presently). Mark off F G, 3 ft.; join

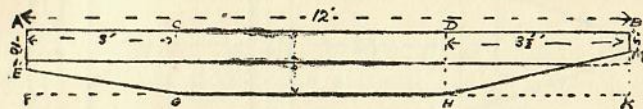


Fig. 3.

E G and saw the corner off. At the other end (the stern end) measure off B M, 5 in., and K H, 3 ft. 6 in., and saw that corner off. Do the same to the other pair of boards and the sides are then almost complete. They must now be properly fastened together, so that when the boat is finished the water will not leak in at the joint when under a heavy load. First of all apply a good coating of white paint to the tongue and groove, and then, without waiting for the paint to dry, fill the groove up to the top with red lead well worked in. Do

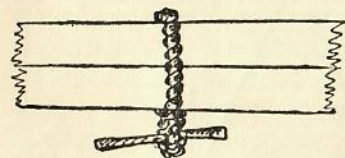


Fig. 4.

this carefully, and see that the red lead fills up *every* part of the groove. Now begin to force the tongue into the groove. You will find it rather hard to get the boards together, but a little persuading, by means of a twisted rope and "twitch," as shown in Fig. 4, will do the trick. Use three of these "twiches" or rope clamps, one at each end and one in the

THE "IMADA"

middle, screw them up slowly, taking care to keep the boards flat all the time. In this way the tongue will be driven home into the groove, and the red lead will be forced out of the seams.

Having succeeded in bringing the boards together, we must now turn our attention to fastening them on to the bow-piece. Fig. 5 explains how this is done. A little chiselling at the edges of the boards is necessary, as they must

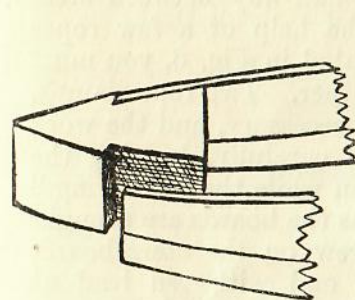


Fig. 5.

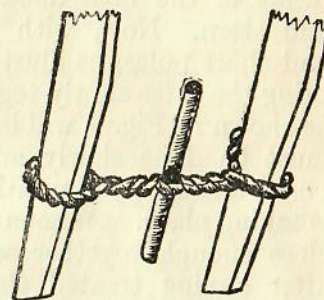


Fig. 6.

be slightly bevelled in order to fit the block exactly. You will understand this by referring to Fig. 2, A B. Paint the parts of the block that the boards fit into, and also paint the ends of the boards with white paint, give them a coating of red lead, and fasten them on to the block with 3-in. brass screws countersunk.

Now saw out the stern-board, length 3 ft. 2 in., depth 5 in. It is advisable to cut this out a few inches longer than required, and saw off the extra piece after it has been fixed to the ends of the side-boards. The bottom edge may be slightly

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bevelled in a line with the bottom of the side-boards.

We now come to the most difficult part of the work—the bending of the sides to give the boat a graceful curve, and the fixing of the stern-board to hold the sides in position. You will need help for this, besides strength and patience. Saw out of any piece of rough wood a board 4 ft. long and about 8 in. wide, and fix it across the inside of the boat about half-way between stem and stern. Now, with the help of a few ropes and short poles, as illustrated in Fig. 6, you must bring the sides slowly together. Two rope clamps, as shown in Fig. 6, will be necessary, and the work must be done slowly and carefully, keeping the board amidships in position while the “screwing” is taking place. As soon as the boards are brought close enough together screw on the stern-board, after having treated the end with red lead as described before; use long brass screws and countersink them. Before undoing the ropes fasten on the stern seat (see Fig. 1), which is made of two boards 3 ft. 2 in. by 6 in., and 1 in. thick, screwed to the top of the gunwale. The tongue, still on the gunwale, must be planed off first.

The boat must now be turned upside down and the bottom put on. The boards for the bottom are the same kind as those used for the sides—tongued and grooved. They are fixed across the boat and screwed to the bottom of the sides. Commence at the stern end and work up to the bow. Each groove must be well filled with red lead as described above, and the boards driven well home. One cannot take too great pains over

THE “IMADA”

this, as leakage is absolutely certain if it is not done thoroughly.

At the corners, α, η, in Fig. 3, the boards will have to be forced slightly to make them fit, but this will not be found very difficult. The last board fixed at the bow end must be bevelled down to the edge, and a corner taken off the under side of the block in a line with the surface of the board, as shown in Fig. 7, A B, otherwise an awkward angle will be noticed. All the bottom boards are secured with brass screws, countersunk. If there

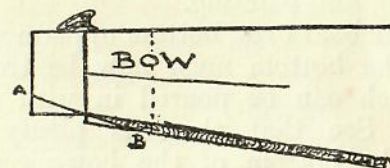


Fig. 7.

are any seams that need caulking use “tow,” and ram it in well with a chisel; afterwards pour pitch into the seams; this is very effective in making the boat water-tight.

The tongue on the gunwale can now be removed all along with a plane, and the sides of the boat trimmed up. The seats alone remain to be put into position.

You can use your own judgment as to where the seats are to be placed and how many you will have, but care must be taken that the balance of the boat is preserved. The safest way of fixing the positions is by experiment after the boat is launched. I have two, one at about 3 ft. from the bow, the other about a foot behind the

half-way line, where the boat is widest. Cut out two pieces of wood 11 in. deep, 7 in. wide, and 1 in. thick. Secure these firmly to the sides of the boat where the seats are required. The seats rest on these, and are thus 2 in. below the top of the gunwale. Cut out the seat from strong wood 7 in. wide, 1 in. thick. Place it in position and fix firmly to the rests. After fixing the seats knock out the piece of wood that was placed in the centre of the boat when the sides were being drawn together. The boat is now ready for caulking and painting.

Turn the boat over, bottom uppermost. Every seam in the bottom must now be treated with pitch, which can be poured in with a ladle or saucepan. See that there is plenty of pitch between the bottom of the bow-piece and the bottom boards of the boat. The inside of the boat, where the bottom boards are joined on to the sides, should also receive a fair quantity of pitch. Other seams can be caulked with red lead. The boat is then ready for painting, and first of all, after the necessary sandpapering, must be primed all over with lead priming. When dry give it its first coat of paint. The "Imada" is light green inside, dark green outside, name and bottom white; but, of course, you can suit your own individual taste in this matter. About five or six coats are not by any means too much for it.

The boat is now ready for launching, but there are a few necessary *etceteras* that must be described. It is advisable to have a grating for the bottom to lessen the strain and weight. This

is made in two pieces, so that it can easily be taken out and put in again. Get three pieces of wood 3 in. wide, $\frac{1}{2}$ in. thick, and about 6 ft. long; place one down the middle of the boat on the bottom, the others, one on each side, converging towards the bow. Across these nail similar pieces of wood, leaving about a 2 in. space between them. In this way a useful grating is made. Make a smaller grating for the bow, and paint them both the same colour as the bottom of the boat. It is hardly necessary to describe how to make punting poles. Be sure to get them strong and long enough. You will find a mop useful for cleaning and soaking up any water that happens to find its way in. A bow-ring with a chain and rope attached is a necessary addition.

If you have followed the instructions carefully, you now have a home-made treasure that will give you many hours of pleasure and enjoyment on sunny days, and which you will find will amply repay for the trouble and little expense that it has cost you to make it.

HOW I RIGGED THE CANOE "FROLIC"

By MAJOR BATTISCOMBE.

On the afternoon of one day in the month of September of a year long past, when I was fifteen years old, I had walked down to the house of a man who had always been a great friend to my brothers and myself, and who lived close to the river Wye. In the course of conversation he said:

"I've thought of something to do this afternoon; we will launch my two Rob Roy canoes, and, as there is a nice breeze blowing up the river, we will have a sail."

I nearly jumped for joy at the words; I had never sailed a canoe or anything else in my life, except a toy boat on the Round Pond in Kensington Gardens, and here was the ambition of my existence about to be fulfilled.

I was not clad in the garments usually considered *de rigueur* for boating, being dressed in knickerbockers, gaiters, and thick, nail-studded boots, as it had been a wet morning; but that was a trifle. We soon had the two canoes in the water, and were paddling down to the lower end of the pool preparatory to sailing up.

The Wye, in the part I am writing of, is not an ideal boating river, the pools being small and connected with each other by shallows up which it is necessary to wade and pull one's canoe, unless

THE "FROLIC"

the river is in flood, when the stream is too strong to make canoeing a pleasure.

Arrived at the lower end of the pool, we turned the canoes round, and my friend—I will call him Mr. Val—called out, "I will race you up to the top of the reach!"

"Righto!" I said, and off we started.

The pool on which we were sailing was like this:

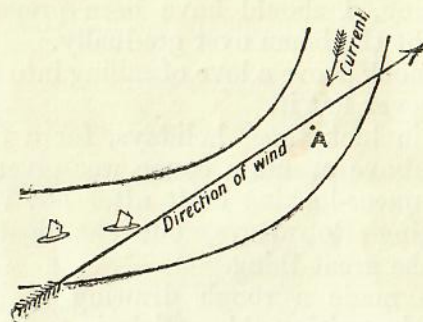


Fig. 1.

I had all the luck at the start, with a good slant of wind, and quickly left Mr. Val astern. When I got to the spot marked A on the chart (Fig. 1), I was so far ahead that I thought I might, like one of Homer's heroes, crow over a fallen foe, so turned round and thus addressed Mr. Val at the top of my voice:

"Why don't you get out and——"

My sentence was never finished; something, it must have been the boom, hit me hard on the side of the head, and at the same moment I found myself in the water. It was a swim of about

CANOES, DINGHIES, AND PUNTS

fifty yards to the bank, and with my heavy boots, etc., was no joke.

Mr. Val righted the canoe and collected the paddle, bottom boards, and cushion which he found floating about. He explained afterwards that I had allowed the canoe to jibe, which means that in going round the bend I had brought the wind on to her other side, and the sail had come over, a thing that, had I known anything at all about sailing, I should have been prepared for, and brought the boom over gradually.

That knock drove a love of sailing into my head that has never left it.

I was in luck those holidays, for a few days after the above events a canoe was given to me. Rather a queer-looking craft after Mr. Val's two smart-looking Rob Roys, but she floated, and that was the great thing.

I have made a rough drawing of her, and my object in writing this article is to show how, to those not gifted with long purses, a great deal of fun can be got out of a very cheap boat.

As you will observe, she has a perfectly flat bottom, with a keel an inch in depth. With the exception of her ribs, which were of oak, she was built of deal, and the village carpenter was her designer and builder. I am sorry to say I never knew exactly what she cost, but it must have been very little, and any fairly good carpenter could build another boat like her at a small fraction of the expense that a properly built boat would cost. The mast and sail were not part of her original outfit, and of these I will now proceed to tell you.

THE "FROLIC"

The summer holidays were drawing to a close, but I had a few trips up and down the river, getting out and towing over the shallows, and then the sad day came when I had to lay her up for the winter preparatory to returning to school.

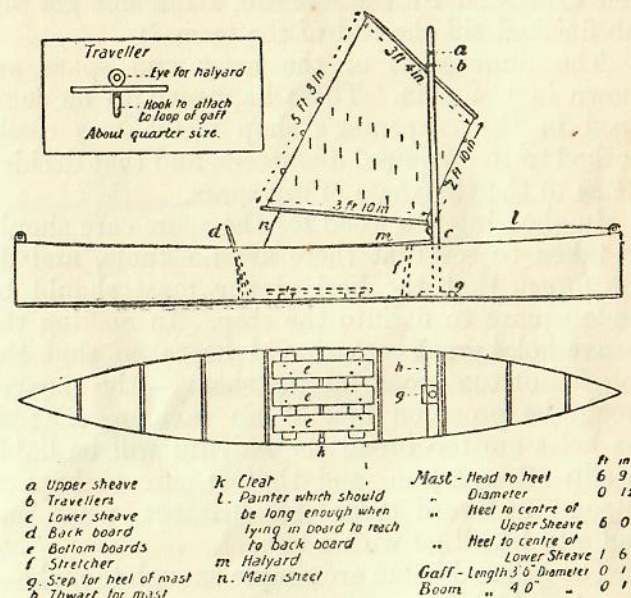


Fig. 2.

One thing I was convinced of—namely, that paddling was all very well, but sailing would be much better and more exciting—and sailing I determined to have.

After I had got back to school I took the books of Rob Roy's canoe voyages out of the library, and, after much study, resolved to

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take his spars and sail as a model for my own. Having done that, I commenced work in the school carpenter's shop in the odd times that were not occupied with football and paper-chases, and as my aptitude for carpentering would be well expressed by the sign ± 0 , I did not get the job finished till the end of the term.

The dimensions of the mast and spars are shown in the plan. There happened to be some wood in the carpenter's shop which was easily worked to the required diameters, and that decided me as to the thickness of my spars.

In choosing the wood for the spars care should be taken to see that there are no knots, and do not forget that the heel of the mast should be made square to fit into the step. In making the sheave-holes great care should be taken that the hole is not too broad for the sheave—the sheaves should be procured first at an ironmonger's; if the holes are too broad the halyard will be liable to slip off and jam, and that is sure to happen at some awkward crisis—for instance, when one wants to let all go with a run.

The gaff and boom are simple enough to make—two straight spars.

I was rather puzzled how to fit the end of the boom to the mast, but finally found the best plan was to use two rings, the same that one screws into the back of photograph-frames, to hang them up by. I screwed one into the end of the boom and one into the mast, a little above the lower sheave-hole, and tied them together with whipcord. I did not know in those days of such a thing as a *gooseneck*.

THE "FROLIC"

The loop on the gaff was made of garden line, as was all my running gear; I made a loop a little larger than twice the size of the gaff by splicing the two ends together, cut a notch in the gaff 2 ft. from the after-end, passed the loop over the notch, and lashed it together tightly, as in Fig. 3. The upper part thus formed the loop

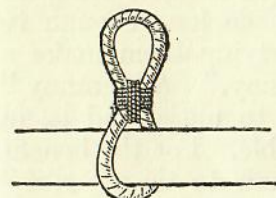


Fig. 3.

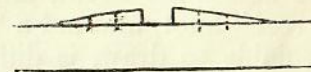


Fig. 4.

to go over the traveller hook. I think, however, a better plan than cutting a notch in the gaff, which weakens it, is to screw two small cleats on to the side of the gaff, as shown in Fig. 4.

I cut a notch 6 in. from the after-end of the boom and spliced the end of the main sheet round it; but here, again, the cleats would have been better.

So much for the spars.

The traveller will have to be made by a blacksmith, or procured from the Army and Navy Stores. Mine was made of iron, but brass would be better, as not liable to rust. The hook should be fairly deep, and when in use should be moused as shown in Fig. 5.

Without the mousing, if the sail is lowered

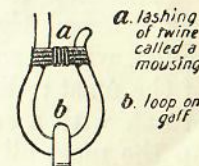


Fig. 5.

hurriedly, the loop on the gaff is liable to come unhooked, which is a nuisance.

The sail was made at home, of the dimensions shown in the plan. Lacing-holes should be made in the head and foot about 6 in. apart to lace the sail to the gaff and boom. I had three rows of reef points one foot apart, and at each end of each row a hole made to act as a "reef cringle." The reef points should be made long enough to tie under the boom, and in tying them make a "reef" knot, and not a "granny." A "granny" is liable to draw, is difficult to untie, and is, in fact, in every way objectionable. For the benefit of those who do not know how to tie a "reef" knot I show below a drawing of one:



Reef knot

Fig. 6



Granny

Fig. 7.

The step for the mast was a square piece of oak screwed tightly down to the bottom of the canoe, with a square hole in it to receive the heel of the mast; directly above it was fixed a thwart of oak with a round hole in it, so that in setting up the mast all that had to be done was to pass the heel end through the hole in the thwart and fit it into the square hole in the step.

All I had to do when I had come in from a sail was to lift up the after-end of boom, gaff, and sail till they touched the mast, take a few turns round the whole thing with the main sheet, lift out the mast, and take it away till wanted

again; it was quite unnecessary to untie the boom from the mast, or unship the gaff from the traveller hook.

The cleat marked *k* in the plan was a mushroom cleat, such as is often used for securing blind cords; the halyard was made fast to this when the sail was set.

I made a rudder to steer with, but discarded it, and always steered with the paddle.

Now a word of advice. When you are sailing in a canoe or open boat *never* make your sheet fast, but *hold it in your hand*; more of the boating accidents that happen every summer occur through sheets being made fast than in any other way. If the wind is strong, the halyard should also be held in the hand.

I daresay many boys would say, "Oh! a capsizes and a swim are rather a lark than otherwise"; but there is such a thing as being a good sailor and being a bad one, and I am perfectly certain that anyone who goes in for sailing or anything else would rather be good than bad at it.

On inland waters the wind hardly ever blows steadily for two minutes together, and a harder puff than usual comes, catches the sail with the sheet made fast, over goes the canoe, and the careless occupant, with, perhaps, the slack end of the halyard caught round his leg, has to make the best of it in the water. Now suppose a careful sailor had been caught by the same puff, he would have slacked away his sheet and spilled the wind out of his sail. As soon as the puff was over he would have gathered in his sheet and sailed on as if nothing had happened, and with

CANOES, DINGHIES, AND PUNTS

the pleasant self-consciousness of having done the right thing.

My canoe was not good at going to windward, except, of course, with the stream under her lee. I think another inch of keel would have been an advantage; but, for all that, many are the good times I had in her. She taught me the rudiments of sailing, and I look back with fond regret to the days of my good old "Frolic," for that was her name.

A CENTREBOARD DINGHY AND HOW TO BUILD IT

By D. F. McLACHLAN.

CENTREBOARD sailing dinghies have of late years become very popular, and it is hardly possible on a summer day to visit any of our coast towns without seeing a few of these handy, able little boats. The designing and building of these little clippers have now reached a state of perfection, and their popularity is easily seen by the number of races which are held, for it is surprising the speed that can be got from a boat twelve feet in length.

This boat is a typical Clyde dinghy, and rigged with a standing lug—the best sail, in the writer's opinion, for all-round work.

The centreboard, which is about 40 lb., gives her a draught of 2 ft. 9 in., when lowered for beating and reaching, and when raised for running, 5 in. This does away with any inside ballast that would otherwise have to be carried, for inside ballast in a small boat is always a source of danger.

Her length is 12 ft. with a beam of 5 ft. for stability. The water-line, which is 11 ft. 9 in., has been kept as long as possible in order to give power. She carries about 100 sq. ft. of canvas, and this she stands up to admirably in the hard breezes one meets on the Firth of Clyde.

By looking at the lines (Fig. 2) you will see

CANOE, DINGHIES, AND PUNTS

that the centre of buoyancy has been kept well aft, and fine lines introduced forward. This is

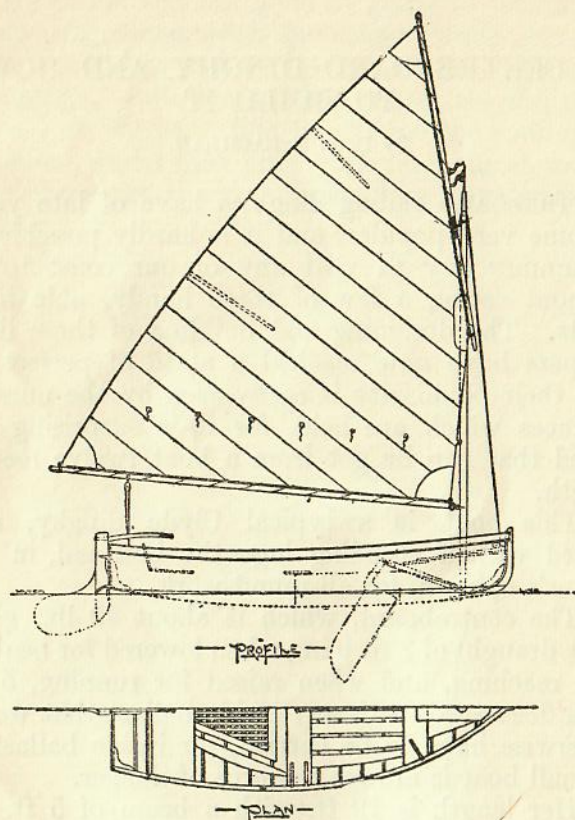


Fig. 1.

characteristic of all small sailing craft, for it stands to reason that once the crew get aboard they trim by the stern.

A CENTREBOARD DINGHY

She is clincher-built with no dead wood aft; the reason for this being that it is much easier to plank a boat of that section; besides, it makes

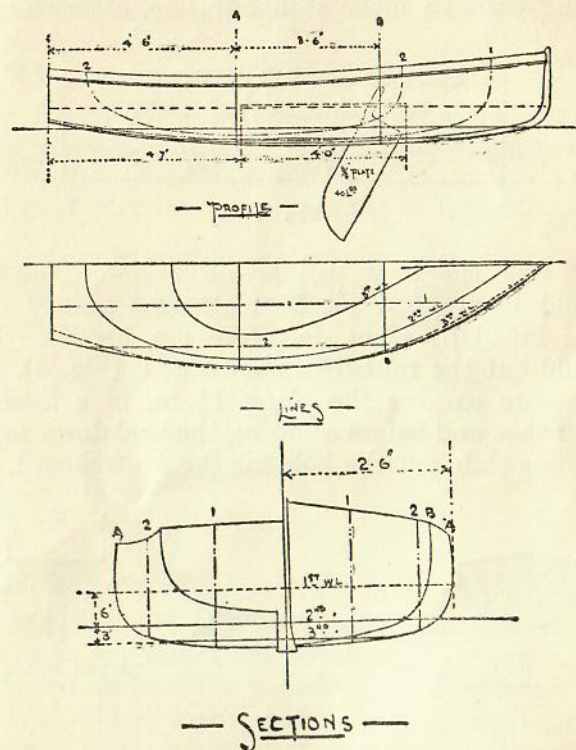


Fig. 2.

her very much quicker in stays, and she will come round in her own length.

But now let us proceed with the practical details for the construction of the boat. The first thing you will have to do is to prepare a

CANOES, DINGHIES, AND PUNTS

building-slab (see Fig. 3). Any old staging or scaffolding-plank will do, but it will require to be cut away on the top edge to the dimensions given, taking care to make it a fair line, otherwise the

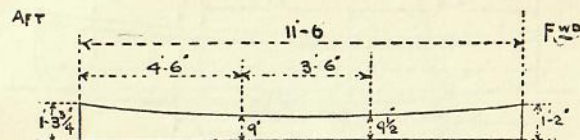


Fig. 3.

profile of the boat will be all askew. The keel should be a good piece of straight-grained elm, 5 in. broad by $1\frac{3}{4}$ in. deep (see A B, Fig. 4). You should cut the rabbet as shown at c (Fig. 4), and take care to give the plank $1\frac{1}{4}$ in. of a landing. After this, and before screwing the keel down to the building-slab, cut the hole for the centreboard.

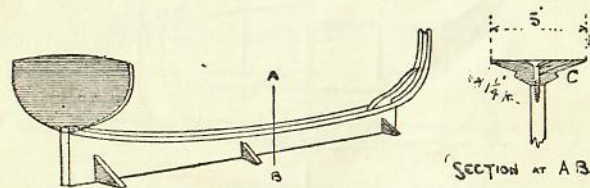


Fig. 4.

It is $\frac{3}{4}$ in. wide, and the exact position and length of it you will get by looking at the profile (Fig. 2). After this the keel can be screwed down to the building-slab, with a screw, say, every two feet; but don't put them in too hard, for they have to come out again.

Now for the stem-post and stern-board. Take

A CENTREBOARD DINGHY

the stem first and draw down the exact shape from the profile (Fig. 2) by using the scale at the foot of the sketch, and from your drawing make a pattern or mould out of thin wood or thick cardboard.

You should then take this pattern to the saw-mill and ask them to cut it out of 2-in. oak. By looking at A, B (Fig. 5) you will see the section of it, and to this you will require to work. To do this properly, begin by working it into the shape

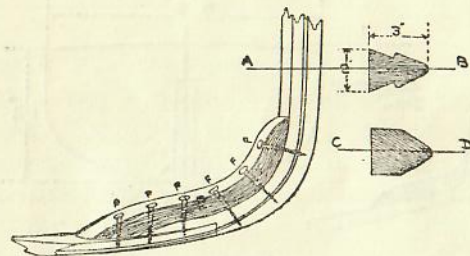


Fig. 5.

shown at C, D; and after you have tried it on the keel and got it to your satisfaction, draw the rabbet on and cut it out with a sharp chisel.

When doing this, make sure that it runs into the keel rabbet with a nice sweet curve. In order to get a good fastening to the keel a deep knee will require to be fitted, as E (Fig. 5).

When all is finished and ready for setting up, begin by fastening the stem to the knee-piece by 4-in. heavy brass screws as F (Fig. 5), and after carefully plumbing and adjusting, white-lead the scarph, and firmly screw the whole thing down to the keel, as shown.

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Next comes the stern-board (see Fig. 6). This is made out of mahogany, for appearance, and is $\frac{7}{8}$ in. thick. The dimensions can be got from Fig. 6, and be sure and give it a nice round, and don't forget the bevel, which will be about $\frac{3}{8}$ in.

You will notice that the bottom of the board is checked out to receive the keel A (Fig. 6), and it is held in place by a deep knee firmly screwed to the keel with brass screws as at B (Fig. 6).

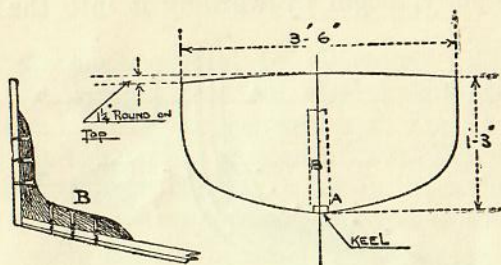


Fig. 6.

Before screwing it down satisfy yourself that it is perfectly plumb.

Now take a long batten fairly stout, say about 3 in. by $2\frac{1}{2}$ in., and nail one end of it to the centre of the stem-head and the other to the centre of the stern-board (see Fig. 7). Two $\frac{5}{8}$ -in. holes will require to be bored in this batten, the first one 4 ft. 6 in. from the stern and the second 8 ft. from the stern. These are for the sections to swing in. After this take a plumb-line and mark off spots on the top of the keel exactly below these holes, and take your brace and $\frac{5}{8}$ -in. bit and make a couple of bores $\frac{3}{8}$ in. deep. These are to take the bottom catches of the sections as A (Fig. 8).

A CENTREBOARD DINGHY

Next comes the construction of the sections A and B (Fig. 2), and all you have to do is to measure them off by using the scale at the foot of the

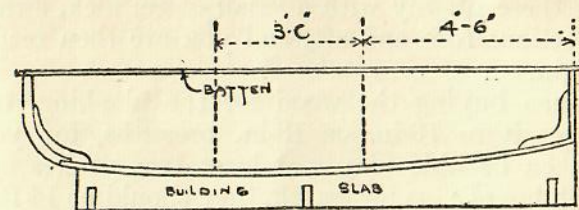


Fig. 7.

drawings. It is not necessary to use new wood for them: any old stuff will do, such as packing-boxes, &c., for when the boat is planked up they are of no more use and are taken out.

You must be able to swing these sections from side to side without fouling anything and they must always be kept plumb and rigid.

Once you have the sections up in place and everything satisfactory, you can make a start with the planking, and this part of the work you will find very interesting, for you will see the shape of the boat standing out as you proceed with the work.

She has eleven strakes each side, the top, or sheerstrake, being of mahogany or teak for appearance.

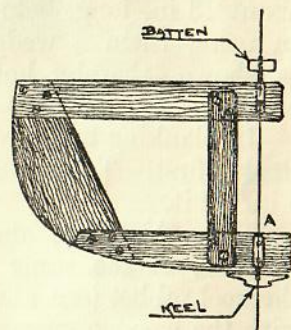


Fig. 8.

CANOES, DINGHIES, AND PUNTS

You will have to divide the girth of the stern-board and sections into eleven equal parts, allowing, of course, for a lap of 1 in. for nailing purposes. Mark these plainly with a small chisel nick, swing the sections fore and aft, and you are then ready to begin.

When buying the wood for the planking, try and get it in 16-in. or 18-in. breadths, for you will then be able to get at least two strakes out of each board; as for length, they should be 14 ft.; and as regards thickness, you will want them $\frac{3}{8}$ in. off the saw, which will give you $\frac{1}{4}$ in. full when finished.

At this stage you should make yourself a few wooden cramps (say eight), as shown at Fig. 9. They are composed simply of two pieces of wood, about 13 in. long, held together loosely by a bolt. In using them a wedge is driven in at the top, as shown, thereby holding the plank tightly in position.

In planking begin with the bottom, or garboard strake first. Take one of your boards and rip 6 in. off it.

Take this piece and bend it easily round the sections, at the same time keeping it hard into the keel rabbet (see Fig. 10), and hold it in position with the wooden cramps. Mark off where the line of the stem rabbet comes (keeping it full for safety, of course) and also where the first chisel nick comes on the sections and stern-board. Then knock out the wedges of the cramps, take the plank off and work it to the shape. In this strake there will be very little shape, and the top edge will be practically straight. In the forward part,

A CENTREBOARD DINGHY

where it comes on the stem, you will find it will have a twist towards the upright.

When you have got the plank worked into shape, and you are satisfied that it sits nicely into the rabbet all round, take and lay it on the remainder of the board which you cast aside and draw down the shape for the bottom plank on the other side, and then take and fit your plank in position again and nail it down to the keel, stem,

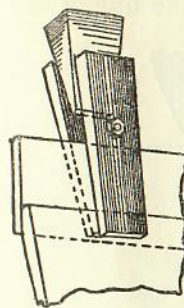


Fig. 9.

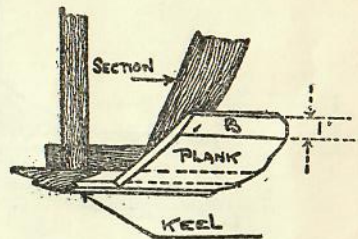


Fig. 10.

and stern-board, using 1-in. nails and clinching the points in the inside.

In nailing planks, start at the stem, and going along the bottom finish at the stern. The holes should always be carefully bored beforehand, as the planks are liable to split if they are under the strain of a heavy twist.

After you get the bottom plank securely nailed up, take a hand plane and fair the top edge to a nice easy curve, and also plane away the top outside edge till it is about $\frac{3}{16}$ in. thick, as at B (Fig. 10). This forms a surface for the next strake to lie on.

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By looking at A (Fig. 11), you will see that the plank at the fore end is cut away on the top edge for a distance of about 9 in., in order that the next strake will come flush and be nailed through it to the stem.

Now take the bottom plank intended for the other side with the shape drawn out on it, and go through the same process on that side.

Next comes the second plank. Take another board and rip it up the centre, and take one of the

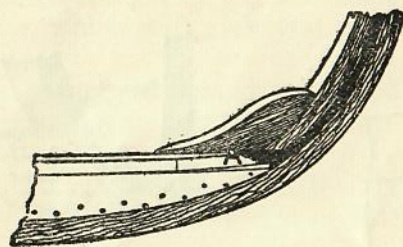


Fig. 11.

halves and put it in its intended position, allowing it to overlap the bottom plank by about 1 in. at midship. Mark off the spots on the inside as before, and also draw by on the inside the top edge of the bottom plank.

Take it now and shape it to these spots, and be careful when doing the bottom edge to allow 1 in. deeper than the pencil line for a landing or lap.

When you have got it worked to a good fit all round, it can then be nailed up. You should space the nails in the landing 8 in. centre to centre, for you have a timber or frame coming in between.

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At each of these stations first bore a hole with a bradawl, and then drive in a $1\frac{1}{2}$ -in. nail from the outside, at the same time holding on with the head of a heavy hammer on the inside. This is to bring the two surfaces close together.

The riveting can then be done as follows. Place a copper rove or washer over the nailpoint, and, taking a small piece of hard wood, place it over the nail and strike it several times with a

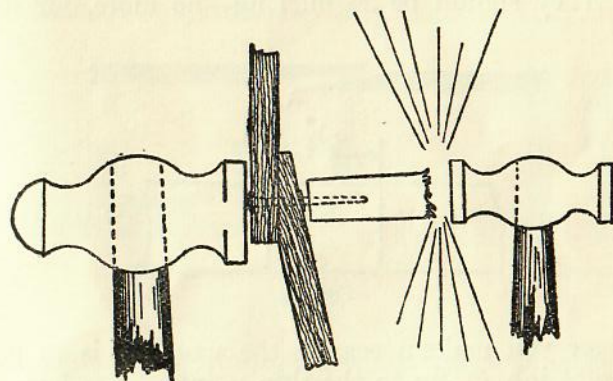


Fig. 12.

hammer, as illustrated in Fig. 12, holding on at the same time with a heavy hammer on the outside. This will have the effect of driving the rove hard into the wood, and thereby making a very secure joint. The points of the nails should then be cut off with a pair of cutting pliers, and riveted well over the roves with a light hammer. These roves can be bought along with the nails, and are sold by the pound.

The other planks are done in the same manner,

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excepting that you will not require to divide off your nail-spacing, but simply drive in nails above those already in their places, in this way making complete rows of nails right up the boat's side.

Some of the planks which have excessive sny or twist you may want to scarph in order to save wood, and if so, take care when making the scarphs to give them a hollow on the fitting surfaces, as shown at A (Fig. 13).

They should be $2\frac{1}{2}$ in. long—no more, for the

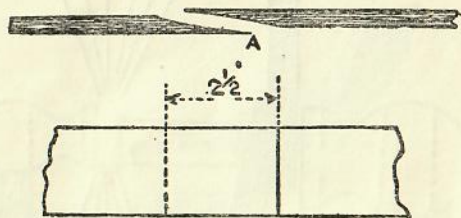


Fig. 13.

longer you make a scarph the worse it is to get a tight job, owing to the thin points. For fastenings use $\frac{7}{8}$ -in. and $\frac{3}{4}$ -in. tacks, and take care to clinch them well inside.

Never allow scarphs in adjacent strakes to come nearer than three or four feet, and in practice it is always better to have one strake running the full length of the boat between any two scarphed ones.

Take care when doing the sheerstrake, which is the highest plank, to give it a nice fair curve on its top edge, for there is no plank above to cover it.

Once you have got her planked up, I think it

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would be advisable for you to turn your attention to the making and fitting of the centreboard case, as after the fittings, such as thwarts, etc., are in, it is difficult to get free access to work.

By looking at Fig. 14 you will see a sketch of the case, and the end, you will notice, is left off so as to show the construction. The side coamings are of $1\frac{1}{2}$ in. mahogany, and are half checked at the bottom into the keel. Four long brass screws are then put in from the side, as B, B (Fig. 14).

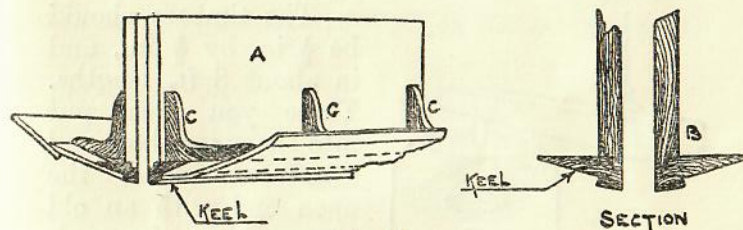


Fig. 14.

Before screwing down, these coamings should be well bedded in white lead to ensure a thorough watertight job.

Three oak knees are fitted each side (see C, Fig. 14) to stiffen the case and take up any lateral strain that may come on it. These knees should be 1 in. thick, and should extend up the case for about 10 in., and at the bottom they should come well out on to the second plank. The covering pieces for the fore and aft ends should be $\frac{3}{4}$ in. thick, screwed on with brass snap-headed screws on a layer of white lead. As for the top, leave it open, for it is well above the water-line.

Now make a start with the framing or timbering;

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and you will here require to use steam, otherwise you will have difficulty in making a good job. Begin by making a steam-box, as shown at Fig. 15. This should be about 9 ft. long by 10 in. by 6 in. deep, with one end left open for drawing the timbers as you use them. A hole 2 in. or $2\frac{1}{2}$ in. is bored on the under-side, and a short piece of iron pipe tightly inserted. This apparatus you can then place over a washhouse boiler, as shown, a small hole being cut in the boiler to allow of the pipe being inserted.

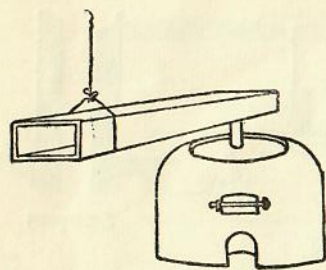


Fig. 15.

The timbers should be $\frac{1}{2}$ in. by $\frac{1}{2}$ in., and in about 8 ft. lengths. These you must put into the steam-box, and afterwards cover the open end with an old bag or piece of carpet. When the water begins to boil the steam will rise, and in about half

an hour they will be sufficiently soft to allow you to proceed with the bending.

In timbering the boat, start from midship and work forward and aft. It is a simple job, and is done as follows. Take the frames out of the steam-box, and, catching them by the middle, bend them down into the boat, hard on to the keel, between every row of nails. At the forward end, and also in the way of the centreboard case, the bend will be too great to allow the frames to extend from side to side in one piece, and you will therefore require to fit them in halves.

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In nailing you drive a nail through each landing, as shown at A (Fig. 16), and in this way the whole structure is held well together. The points of the nails should be clinched as you go along.

This part of the work must not be hurried, and you should take your time and do each timber carefully, always making sure when driving the nails in from the outside that they come fair through the centre of the timber. If you see to this, you will get them all in without splitting.

After you have got them all in, take a tenon-saw and cut the heads off at $1\frac{1}{4}$ in. below the top

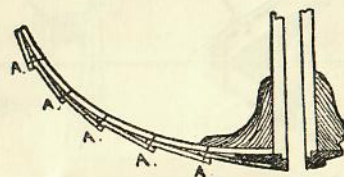


Fig. 16.

of the sheerstrake, in order to let the gunwales sit in and come flush on the top with the sheerstrake.

These gunwales are of pitch-pine, $1\frac{1}{4}$ in. by $1\frac{3}{8}$ in. at midship tapering to $1\frac{1}{4}$ in. by 1 in. at the forward and after ends. They will require to be steamed slightly at the fore end. On each side bend them into the curve of the boat, allowing them to come together at the bow (see Fig. 17), and putting them hard against the stern-board aft, as Fig. 18. For fastening these gunwales you will require to use 3 in. copper nails, and you must drive them in from the outside and clinch them with or without roves on the inside.

If you wish to give an extra finish to the boat,

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you can add a finishing strip of elm (see Figs. 17 and 18). This greatly enhances the appearance of the boat, and no doubt you will have noticed that it is generally fitted to yachts' boats. It runs for the full length of the boat, and covers the seam between the sheerstrake and the gunwale.

A belting, for appearance' sake, of $\frac{5}{8}$ in. half round of elm, should be run round the foot of the

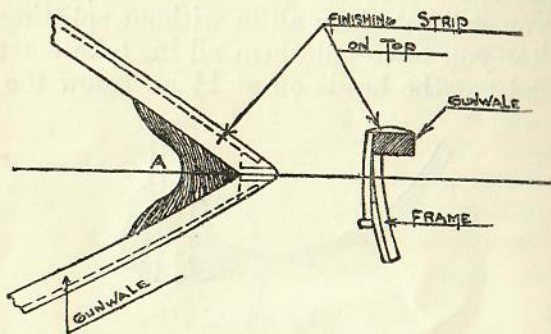


Fig. 17.

sheerstrake outside. This, with the addition of a cavetto above, on the top side of the sheerstrake, about $1\frac{1}{2}$ in. down from the gunwale, will greatly add to her looks.

At the forward and after ends knees are fitted to stiffen her up (A, Figs. 17 and 18). These should be of oak or larch (natural bends if possible), and are the same depth as the gunwales. They should, be neatly made with nice long tapering ends, and you will require to fasten them with 4-in. and 5-in. galvanised nails driven hard home from the outside, with the points clinched over in the inside. These

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knees stiffen up the boat immensely and prevent any twisting.

The stringers to take the seats will at this stage require to be made and fitted. They are 2-in. by $\frac{5}{8}$ -in. elm, and should come about 8 in. below the top of the sheerstrake. They are screwed to every frame with a $\frac{7}{8}$ -in. brass snapheaded screw.

Now put in the thwarts or seats. You will see

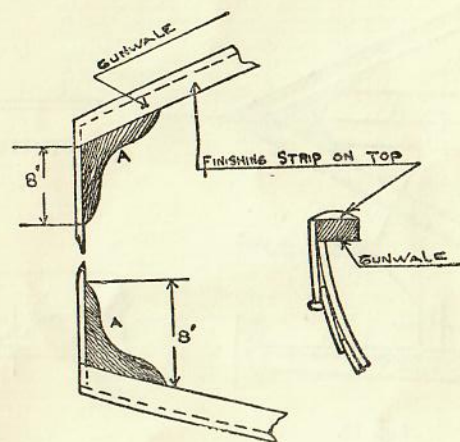


Fig. 18.

by looking at Fig. 1 that there are three. The stern one should be about 12 in. broad, and the midship and forward ones 9 in., and if you make them out of mahogany they will look well. In way of the frames they are checked out to admit of getting a nice fit to the inside of the planking.

A short fore and after is fitted up forward to take the mast (see A, Fig. 19). This should be

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made with a butterfly screw, as shown at B (Fig. 19), in order to be portable, for it is desirable to unship it when you are using the boat for rowing only.

By looking at Fig. 20 you will see the beam knees that are fitted to take the thwarts. These should

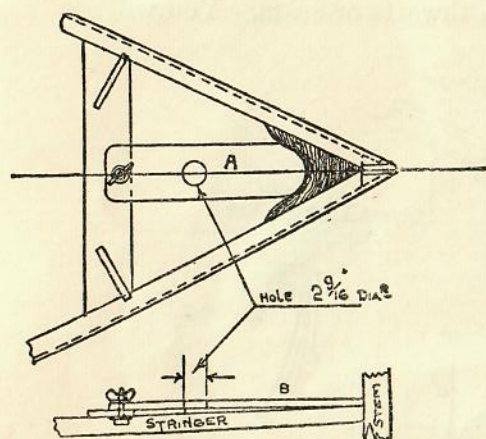


Fig. 19.

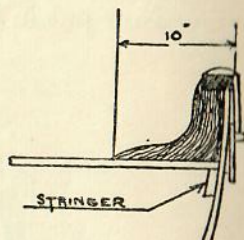


Fig. 20.

be of larch, and if possible natural bends. In way of the midship thwart two are fitted, and on the forward thwart one is fitted, and this one you will notice is set at right-angles to the gunwales. Aft in way of the stern seat it is not necessary to fit these knees. As regards fastenings, in way of the gunwales use $3\frac{1}{2}$ -in. copper nails driven in from the outside, and then riveted over a rove on the inside. In way of the thwarts they are simply nailed down with $2\frac{1}{2}$ -in. nails, clinched underneath.

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The stern-board should now be fitted. For appearance' sake, it is advisable to make this out of a nice-grained piece of mahogany (see Fig. 21). Make sure you give it a nice round on the top, and set it back at a good angle. In a small boat like this it adds greatly to the appearance if the name

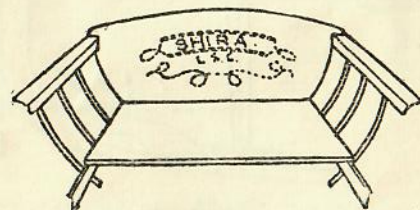
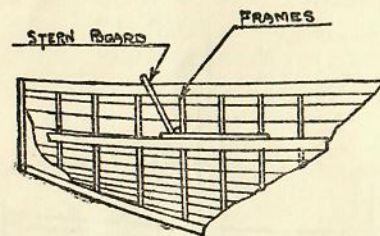


Fig. 21.

is neatly carved out, and it is not a difficult thing to do.

By looking at Fig. 22 you will see the exact position of the mast step, and this can now be fitted. It is simply a piece of hard wood, such as oak, with a $1\frac{1}{2}$ -in. hole in it, firmly screwed down on to the keel. A $2\frac{9}{16}$ -in. hole directly above this is cut in the fore and after. You will require to carefully plumb this hole in order that the mast

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shall be perfectly upright. There is no rake on this mast. It is perfectly plumb. Had she been a boat with a straight keel, however, it would have been totally different, and she would then have required a rake aft of perhaps 6 in. or 8 in. This is where a number of builders make the mistake with small craft.

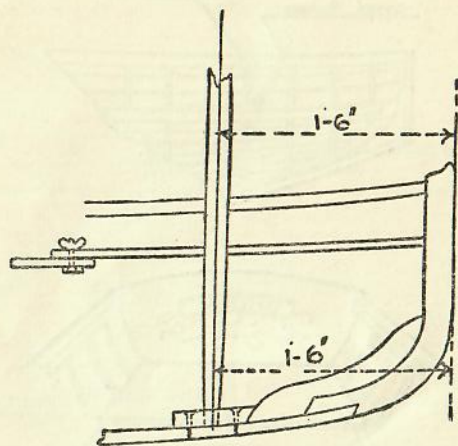


Fig. 22.

The boat should at this stage be taken off the building-slab, by unscrewing the screws in the keel, and these holes should then be tightly plugged up with wooden pins dipped in white lead.

Fig. 23 shows an elevation of the centreboard case, with the arrangement for raising and lowering the board. You should take some thin wood (about $\frac{1}{4}$ in. thick) and make a template or shape the size of the board and fit it in position, and make sure that it is going to raise and lower

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properly, and does not foul anywhere. Then take this shape to a sheet-iron worker, and ask him to cut it for you out of $\frac{3}{16}$ -in. steel plate. If possible you should get the centreboard galvanised—it will only cost about two shillings extra; but if there is no galvanising-works in the vicinity, then give it a few good coats of red lead. It is hinged at the fore end by a brass bolt (see A, Fig. 23). A distance piece, which is merely a piece of pipe, is fitted between the coamings of the case (B, Fig. 23)

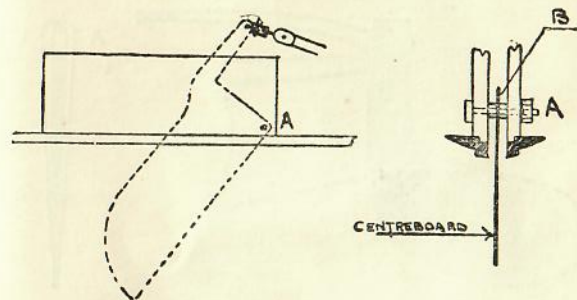


Fig. 23.

and leather washers are placed under the head and nut of the bolt. The bolt can then be screwed up tight, and the arrangement is a thoroughly water-tight job.

The hull is now nearing completion, and it only requires a few sundry jobs to finish it off.

Fig. 24 is a sketch showing the construction of the rudder. The side-pieces A, A, are carried well down past the bottom pintle in order to give strength, for it is surprising the strain which comes on the rudders of these little boats when running free before a fresh breeze. The pintles should be

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galvanised, and they can be procured at any ship-chandler's. The rudder, along with the tiller, should be made out of mahogany, for appearance.

If you turn back to Fig. 1 and look at the plan you will see the floor-boards. These are simply pieces of pine, $\frac{3}{8}$ -in. thick and cut to shape and screwed down to the frames with $\frac{9}{16}$ -in. brass snapheaded screws. They should not run the full length of the boat, but should stop forward and aft, as shown on the plan.

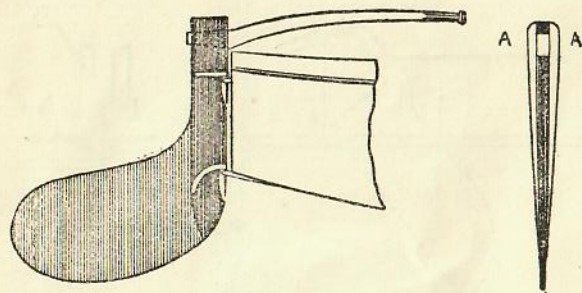


Fig. 24.

The forward platform is constructed of $\frac{1}{2}$ -in. pine; and as for the after platform, if you care to sacrifice a little extra time, you should make it in the form of an elm grating with teak frame.

Aft of the thwart's foot spars are fitted (A, Fig. 25). The catches for these should be checked out and securely screwed down to the frames. The foot-spars are $1\frac{1}{4}$ in. square.

The rowlocks can also be fitted at this time (see B, Fig. 25). These can be bought at the chandler's. When fitting them don't forget the stiffening piece below the gunwale to take the heel.

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The top plates are sunk flush with the gunwale, and are screwed in their places by two small brass screws.

Now you can safely say you have the hull about finished, and you can desert her for a time to look after the rigging.

First we will take the spars, and of these there are three. The mast is 12 ft. 1 in. over all, by

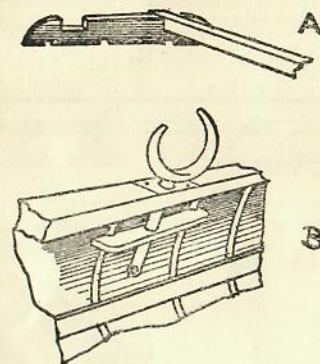


Fig. 25.

$2\frac{1}{2}$ in. diameter at the hasp, $1\frac{1}{2}$ in. diameter at the heel, and 1 in. diameter at the head. Begin by taking a piece of straight-grained spruce, and mark off the exact dimensions at the head and heel by describing circles of $1\frac{1}{2}$ in. and 1 in. respectively with a pair of compasses (see A, Fig. 26), and then plane it down to these thicknesses, keeping it in the square section.

When this has been done, go over it again and take the corners off, when it will assume an octagonal section (B, Fig. 26). After this take a

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small hand plane and again round off the corners, and this will have the effect of making it nearly circular in section. You should then finish it off with a spokeshave and sandpaper, and lastly put in the sheave for the halyard, which you will notice is exactly 8 in. down from the head.

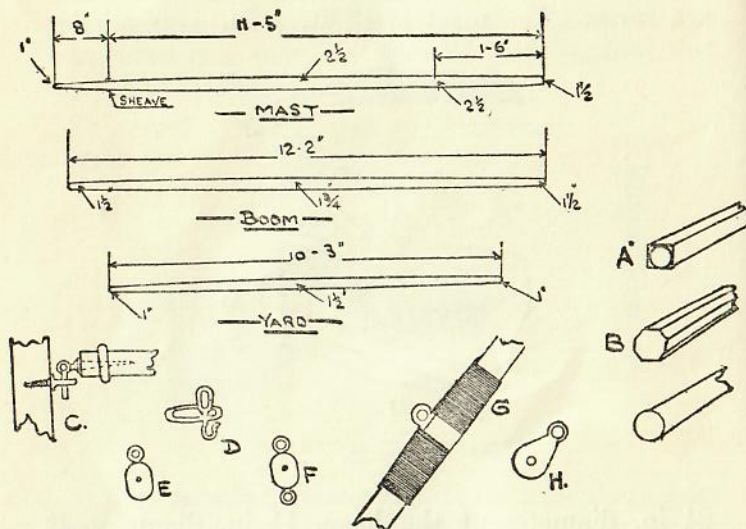


Fig. 26.

The boom and yard are done in exactly the same manner, and the secret of making a nice round spar is always to work it down to the desired thickness in the square section and then begin to round off.

After you get the spars finished, the fittings, etc., can be gone on with. You will see by Fig. 26 I have shown drawings of these, so all you require

A CENTREBOARD DINGHY

to do is to take this copy of the handbook with you to any ship-chandler's and he will be able to give you them from stock. They are as follows: C is the boom-holder; D the traveller for the mast, which hoists the sail; E a 2-in. single sheave-block, and of these blocks you will want two—namely, one for the mainsheet and one for the centreboard tackle; F is also a single sheave-block, and you will require one also for the centreboard tackle; G is a plate with an eye on it; this is screwed and lashed to the lugsail yard, and the eye has to fit the hook on the mast traveller; H is a small iron block, which is shackled to a screw-eye at the back of the stem, to take the lead of the halyard.

These, with the addition of a few screw-eyes and $\frac{5}{16}$ -in. shackles, are all you require in the way of smith work.

For running gear you will require one piece of $1\frac{1}{4}$ -in. manilla, about four fathoms, for the halyard (fathom is six feet), and another piece of 1-in. cotton, say about five fathoms, for the mainsheet, and also a small hank of lacing cord to make fast the sail to the spars.

As regards the lugsail. I may tell you that, for all it will cost, you would do better to get it made by a practical sailmaker, for it is difficult for an amateur to make a satisfactory job. However, if you wish to try it, buy the canvas 24 in. wide and rip it up the centre.

This will give you 10-in. cloths after the $\frac{1}{2}$ -in. hems are taken off.

The bolt-rope, which is on the luff, or side next the mast, is $1\frac{1}{2}$ -in. tarred hemp, and this you

CANOES, DINGHIES, AND PUNTS

should stitch on with a heavy sailmaker's needle. This bolt-rope should be sewn on slack, allowing $\frac{1}{4}$ in. every foot—that is, sew $12\frac{1}{4}$ in. of rope on to every 12 in. of sail. The idea of this is to allow the sail to stretch and form a good set.

When roping the sail don't forget the cringles. You will notice that there are six of them—one in each corner for lashing the sail to the spars, and one at each end of the row of reefs.

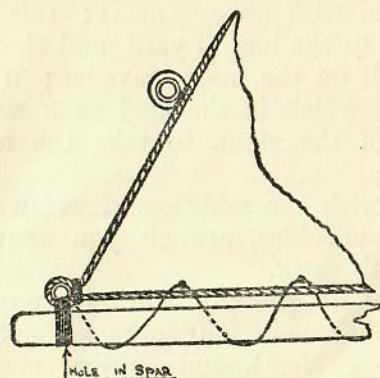


Fig. 27.

Fig. 27 will show how these cringles are fitted, and also how you should lace and lash the sail to the spars.

Your little clipper is now nearing completion, and, in order that she may be perfectly tight, you must caulk the keel and stem post with cotton-wick driven hard into the seam with a caulking chisel; but, if you don't possess such a thing, then an ordinary blunt wood chisel will answer the purpose. Don't force too much cotton into her, but what you do put in drive it hard home.

A CENTREBOARD DINGHY

The shell planking does not require caulking, but you could take a look over it and tighten her up here and there if she requires it.

Now comes the question of paint-work. The inside should receive two coats of good varnish, and as for the outside, that depends on your own taste; but if you have made a good job, I should advise you to give her varnished sides and a white bottom, for I think nothing looks better. The spars should also receive two coats of best varnish.

Should you wish to fit air-cases, and in so doing make her a lifeboat, then two cubic feet will be enough; get one forward under the forward thwart and one aft under the stern thwart.

Now your boat is finished and ready for launching, and I must bid you farewell and leave you to make arrangements for the opening cruise; and I am certain that if you have carefully followed the instructions given you you will be the proud possessor of a fast and powerful little craft. It matters not whether you use her for racing or for cruising, whether you sail in fair weather or in foul, you will find she will more than fulfil your expectations, and she can at all times and under all conditions be compared favourably with the many dinghies which are now annually turned out by the different builders around our yachting centres.

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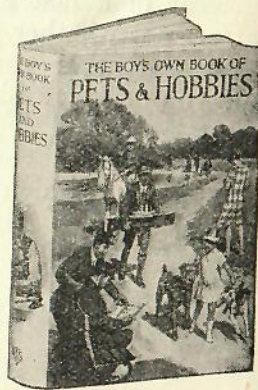
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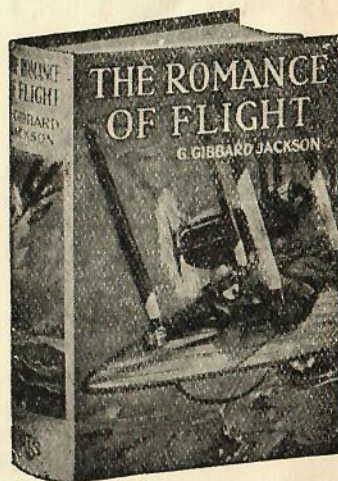
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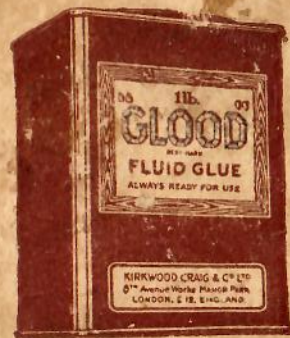
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